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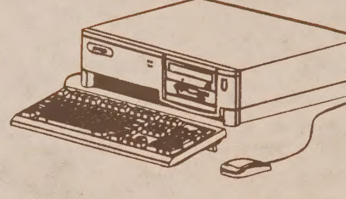

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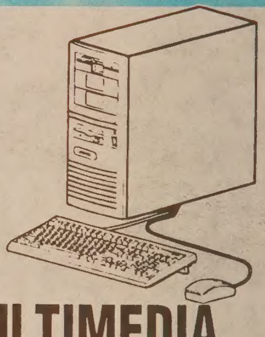

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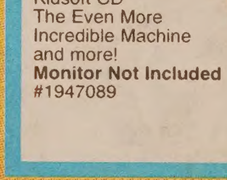

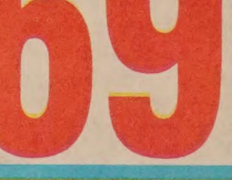

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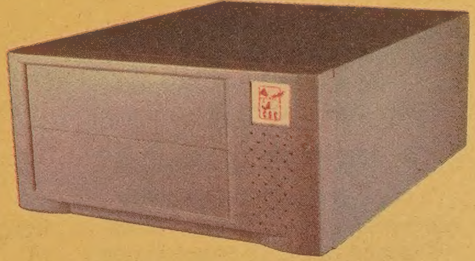

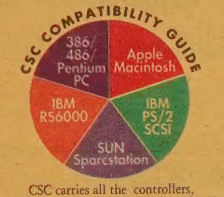

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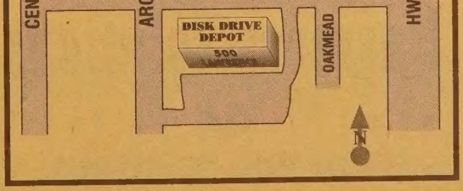

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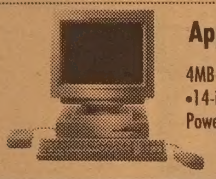

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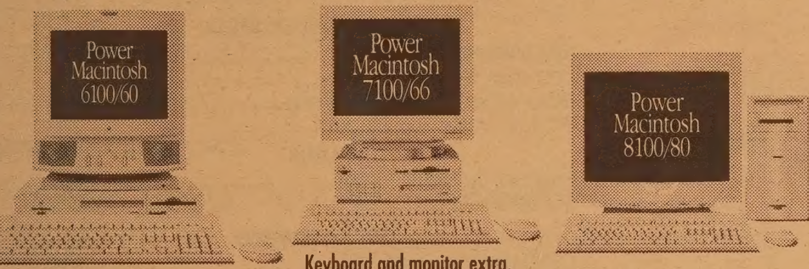

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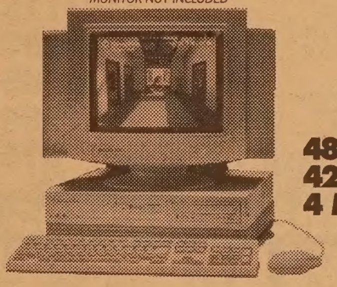

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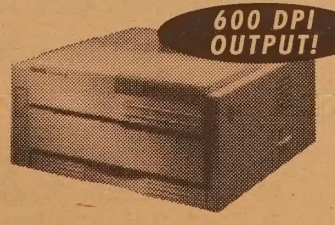

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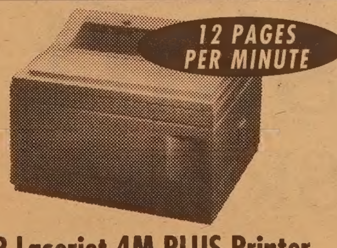

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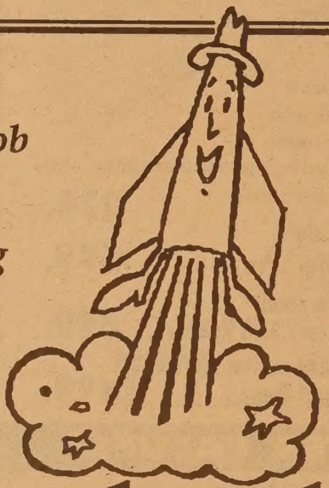
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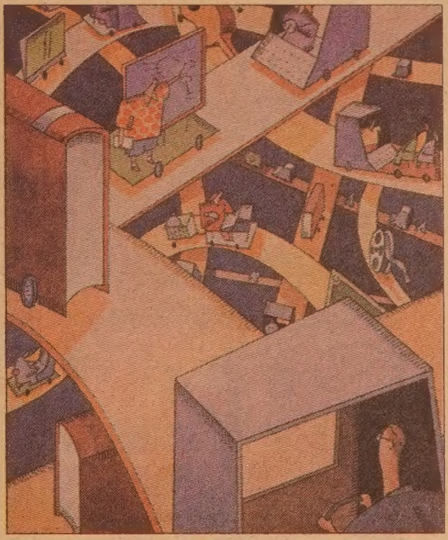

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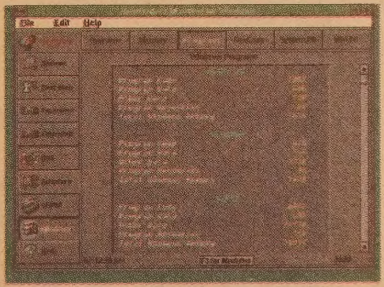

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- 540MB SCSI Hard Drive
- NCR PCI SCSI Controller Card
- Number 9GXE64 Win Accelerator w/2MB
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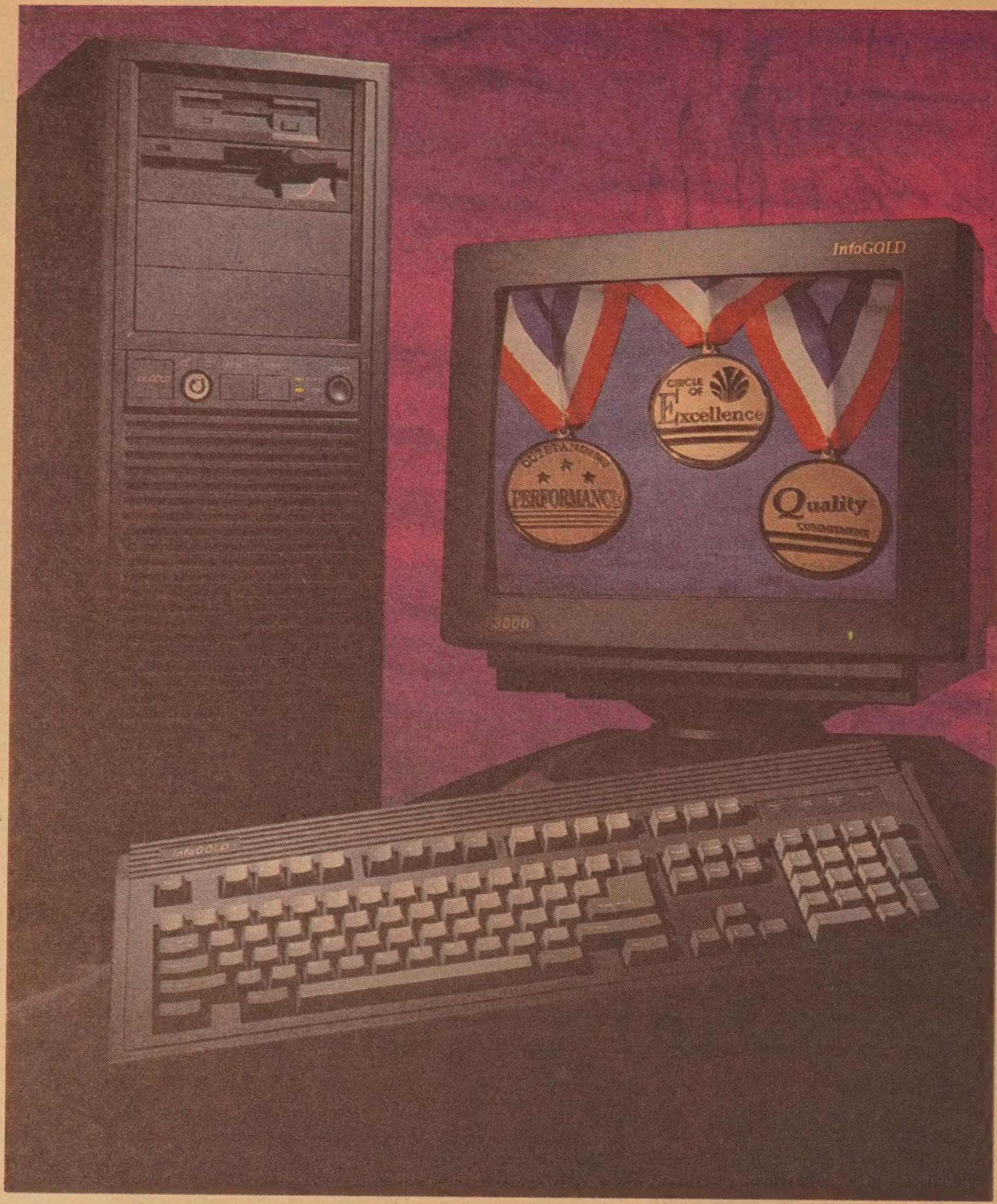

NOVEMBER 199

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MAGAZIN

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Contributors
MICROTIMES

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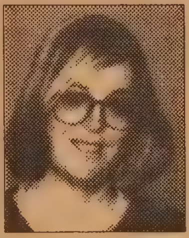

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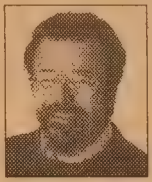

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☛ **Jim Warren** (jwarren@well.sf.ca.us) organized and chaired the First Conference on Computers, Freedom & Privacy (1991), received the Electronic Frontier Foundation Pioneer Award in its first year (1992), led the recent successful effort to make state legislation and statutes available via the public nets without state charge, and received the James Madison Freedom-of-Information Award from the Society of Professional Journalists—Northern California (1994). He also serves on Autodesk's board of directors.

☛ **David Morgenstern** works at *MacWEEK* and volunteers at BMUG.

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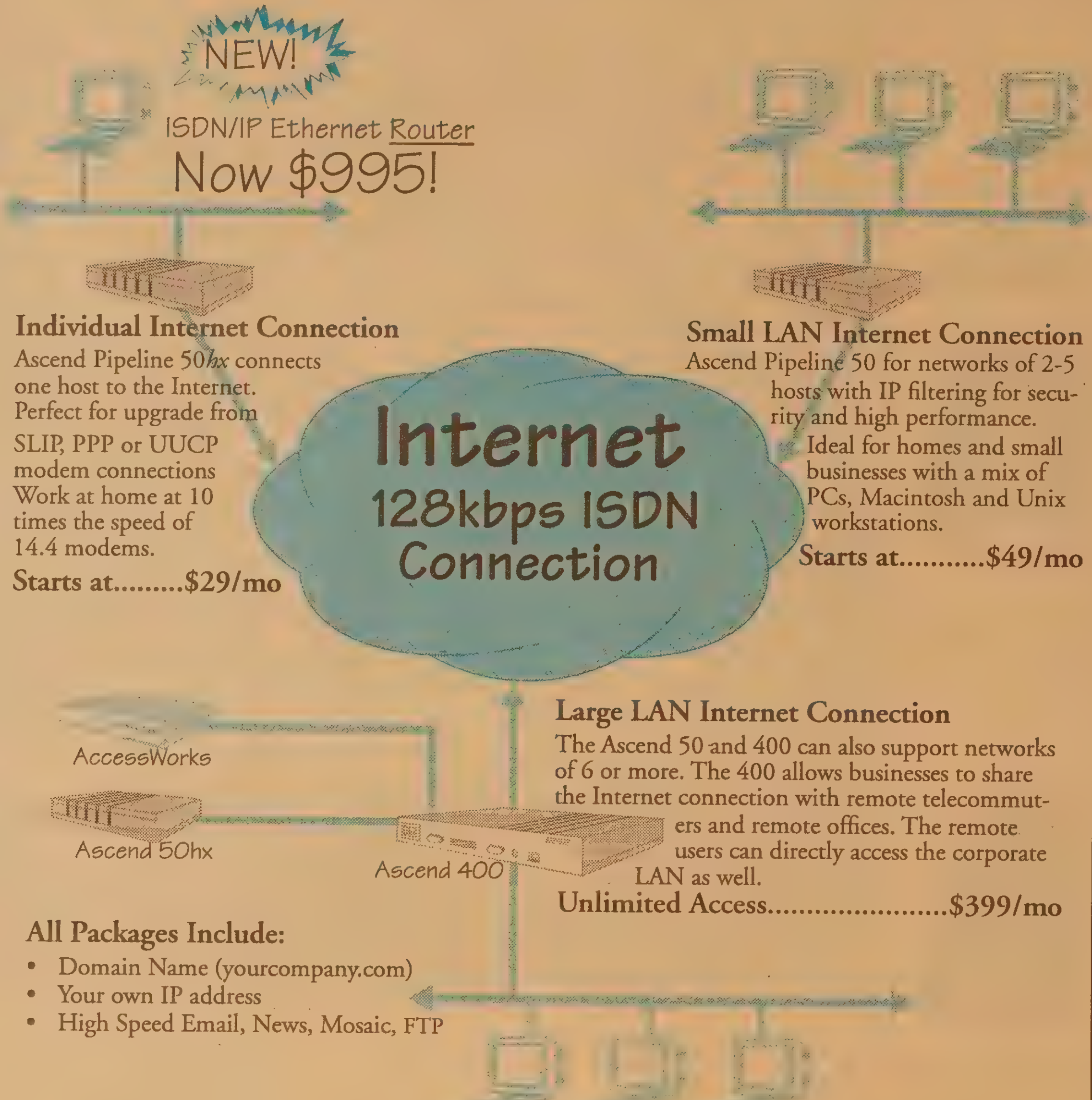

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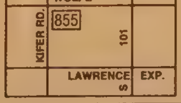

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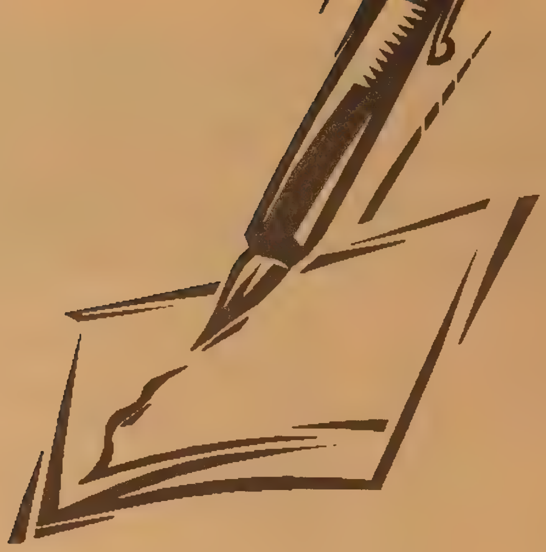

Letters

Mac Chauvinists?

I have long noted an unfortunate tendency of Macintosh users to rewrite history. In a recent article David Morgenstern writes "the whole concept of plug and play computing was introduced to the desktop world ten long years ago with the Macintosh."

Ten years ago absolutely nothing would "plug" into the Macintosh. Steve Jobs had decided that nobody would "need" a hard drive. Many of the theorists at Apple felt that networking would reintroduce the evil centralized computing environment. The machine was a standalone device, a completely "personal" computer.

This is one of the reasons that the IBM PC came to dominate the business market. By the mid-'80s most serious users wanted hard disks and local area nets. These were not availible for the Mac until the late '80s. Even today the Apple idea of "connectivity" (AppleTalk) is inferior to products that PC users had seven or eight years ago.

The Mac is superior to Windows when it comes to building a tight integrated "personal environment.. How important this is in actually using the computer to do real work is questionable, but admittedly it is an "aesthetic experience."

When it comes to doing "group work," the Mac is now competitive with the PC. But this is only because companies such as Novell have extended PC-based applications to the Mac. To pretend otherwise is show a disregard for history.

D Bennett
San Mateo

OS/2 Memories

It was very interesting to read the article "Memory Managers" by Woody Liswood in your recent issue of *MicroTimes*. But I do not understand why anyone would want to spend anywhere from $40 to $150 to purchase any of the memory managers listed in the article, when OS/2 (2.1 for Windows, $14.95 at its lowest) has it built into the operating system. I can get up to 740,333 free bytes (more than any of the Managers listed in the article) available for a DOS session, even with a CD-ROM drive and all other drivers! True, I cannot use graphics in that session, but then to use a DOS graphics program I can always start another DOS session! Those 150,000+ extra bytes for a DOS session have helped me save a few thousand dollars by not purchasing the Plus versions of the DOS structural analysis software that we use at work on a daily basis, which runs faster and can handle bigger problems with more memory.

It is really strange that OS/2 has not been so popular yet. None of my Silicon Valley friends had ever heard of OS/2 until I talked to them about it.

It is good to see you cover OS/2 more than another leading computer magazine I subscribe to. Please keep printing those articles.

Arun Shah
Fremont

Shopping Hell Revisited

I am moved to tell you how much I enjoyed your most recent issue. As a very recent Mac purchaser, I was especially entertained by Jonathan E. on the mad hunt for the perfect setup. I hope you send him out in search of my next target: the right Internet connection.

Keep up the good work, and keep an eye on us Appleheads.

Lenny D.
San Francisco

Telecommuting In The Global Village

The argument against telecommuting as a way to "play hooky" from work (Letters, Issue 127) presented some interesting issues, but is based upon a faulty assumption shared by most major corporations.

I agree with the assumption that employees who are paid hourly for "working time," rather than paid as independent contractors for results or lines of

continued on page 313

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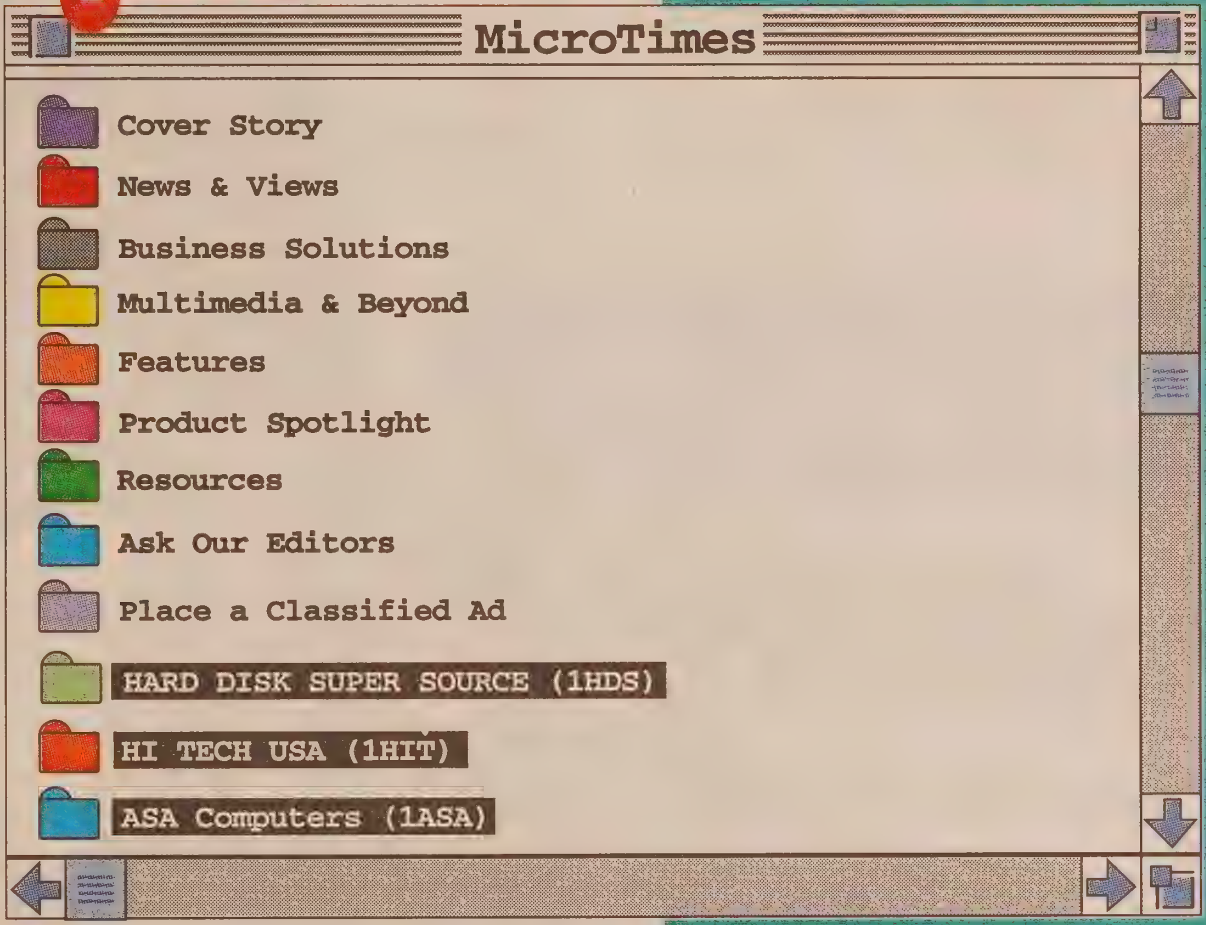
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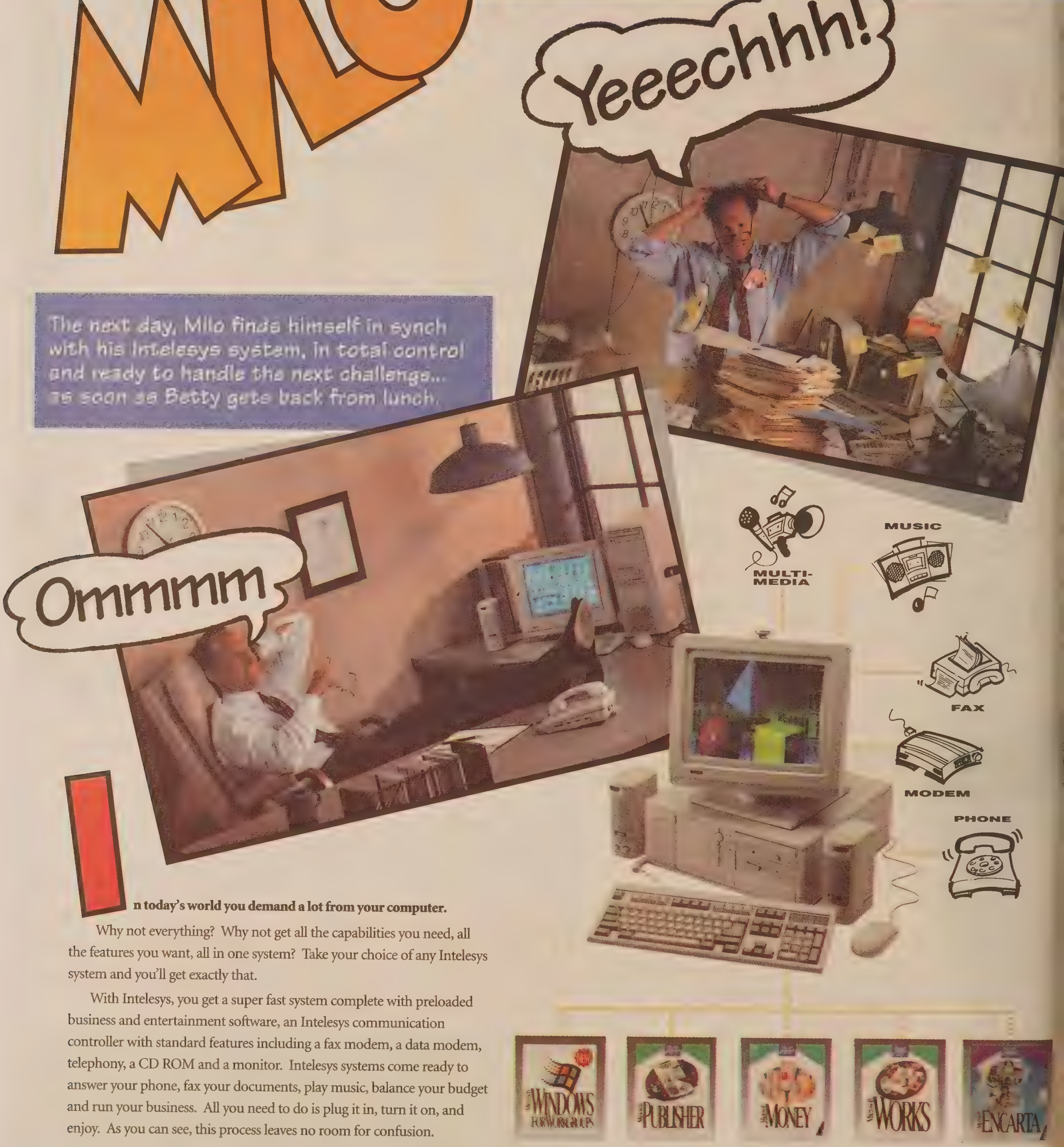

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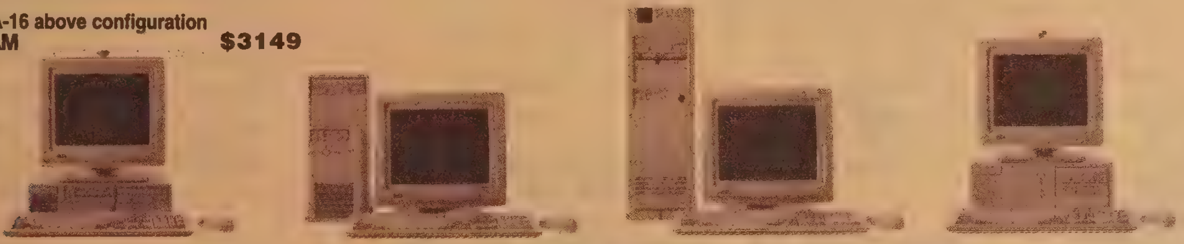

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News and Views

BY PAUL HOFFMAN

Industry Insight

Smaller, Faster, Cheaper Pentiums—But 486s Still Sell Well

Intel has started discussing the next round of improvements to its line of CPUs, and the news is pretty much what many expected: most of Intel's emphasis is on the Pentium line. Because of recent encroachments on its 486 market by AMD and Cyrix, Intel is trying to make it look like the PC market is the Pentium market, and nothing else matters. Even with the expected price cuts and speed improvements in the Pentium chip over the next year, Intel cannot succeed in this goal.

For example, Intel has taken out ads in many computer magazines indicating that the 486 processor is all but dead. The ad shows three sets of nine cats, representing PCs based on 386, 486, and Pentium processors. All the 386 cats have red Xs through them, and seven of the nine 486 cats do too; of course, none of the Pentium cats do. Intel wants you to believe that 80% of the 486-based systems on the market are dead.

According to consumers, this simply isn't the case. The best example of this is the laptop market, where the Pentium has less than 5% of today's sales, and no one expects it to go much higher over the next year because a Pentium CPU can drain a battery incredibly quickly. The portable market continues to grow for many reasons, and many manufacturers are finding that many people want a portable at home simply because it is smaller than a desktop PC.

The market for 486 systems is also incredibly strong for mass-merchandisers like the warehouse stores and electronics emporiums. Almost every such store now has a $1500 multimedia system that is little more than a 486 (or, unfortunately, a 486SX) system with a CD-ROM drive, speakers, and two pieces of old CD-ROM software. A few also have higher-end Pentium-based multimedia systems, but salespeople at the stores say that the more expensive systems only sell to people who are also setting up home offices, while the cheaper systems sell to families who want it for the kids.

Intel's push in the Pentium market next year could possibly make a difference for these systems. Due to better manufacturing and smaller chips, the price of the low-end Pentium CPUs will probably drop by as much as 40% over the year. Intel is expected to phase out its 60MHz Pentium for a 75MHz model and drop the price. At the high end, many hardware manufacturers are already planning for new 120 and 150MHz Pentiums.

> "Because of recent encroachments on its 486 market by AMD and Cyrix, Intel is trying to make it look like the PC market is the Pentium market, and nothing else matters."

However, Intel is not alone in the market. AMD, Cyrix, and NexGen are all working on Pentium-class processors that will probably be introduced within the next six to nine months, if not sooner. These chips will give consumers even more choices, but they will also probably force the price of AMD and Cyrix 486 chips down further. This means that today's $1500 multimedia PC, which shows video from CD-ROM with terrible results, could instead have a low-end Pentium or a high-end 486, and therefore be a much better platform.

Which Superhighway? For Most People, Entertainment Is Still King

The computer industry's current holy grail, a map to the Information Superhighway, is looking harder and harder to find. The hard part here seems to be that the consumer public is just not as interested in "information" as we dweebs in the computer industry are. Sure, the fastest CPUs and the best network connections are being used to exchange "information" and "data" with others; however, they're also being used mostly to play games and watch.

A few companies are catching on. For example, Compaq and AST have started advertising their consumer-targeted multimedia PCs in game players' magazines. Nary a spreadsheet or word processor is mentioned in the ads. Of course, these companies are also still going after the corporate, small office, and home office mar-

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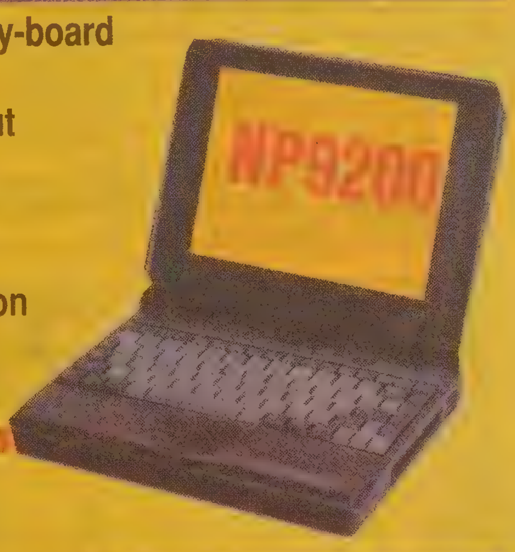

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kets, but they are also realizing that many systems are being bought for little else than to play cool games.

This makes sense if you look outside of the computer market. Over a hundred million people watch at least an hour of television a day; many watch three or four hours. Only a tiny fraction of these hundreds of millions of hours are spent watching "information": they're mostly watching entertainment. Even the few high-information channels that are popular, such as CNN and Discovery, have a surprising amount of information about entertainment such as sports.

Computer-based games are doing increasingly well as more people have home systems with CD-ROM drives and fast graphics built in. New games are anticipated as much as new versions of business software, as evidenced by the current hype for Doom II, a fairly violent shoot-'em-up game that's the successor to the popular Doom.

Because packages like the new Lotus, WordPerfect, and Microsoft suites cost ten times as much as the popular games, they certainly get more publicity and reviews. However, there is no dearth of coverage for new PC and Macintosh games.

Still, the real question is, "What does the non-computer audience want?" You can only go on so long creating hardware and software for the current market. The much-hyped answer seems to be "set-top boxes," tiny computers that will work with your cable system to let you interact with your television and have two-way communication with, well, somebody. However, every test of interactive television that has been tried has shown that people don't want to interact and are perfectly happy with their current mode of two-way communication with the somebodies out there: the telephone.

> "The consumer public is just not as interested in 'information' as we dweebs in the computer industry are."

The set-top boxes, if they ever become popular, will give consumers the same choices as they have now for television: entertainment and information. Guess which will win? Actually, probably neither. Interactive television requires you not to stare blankly at the screen for long periods of time, which is precisely what many people do because that's precisely what they want to do. Interaction will probably be more useful for asking questions, like "What else is on other channels right now?" But look at how many people would rather channel scan or just watch whatever's on now than even pick up the *TV Guide*.

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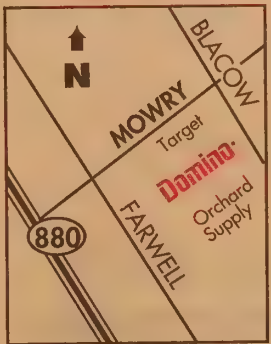

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Industry Insights *continued*

The "promise" of set-top boxes is the same as the promise of homes with a single programmable central control: great for a few, probably overpriced for many, and of no interest to the vast majority. Look at the failure of pay-per-view and video-on-demand: almost no one trusts their cable company or phone company as much as they trust their local video store. Even the worst video store often has better customer service than the best cable or phone provider. Because of this, most people are willing to sacrifice convenience, and often price, in order to go rent a movie instead of using pay-per-view and video-on-demand.

Many people are hoping that, if you can't bring computers to television via the set-top box, maybe you can bring television to computers. Some of that is happening today with the proliferation of hardware that allows you to turn your television into a computer monitor. For $300 to $500, you can use your TV screen for playing your favorite games on a much larger screen. Or, you can get cards that allow you to watch TV on your PC or Macintosh screen as you "work." However, these systems are not that popular—they cost more than a high-quality, regular size television.

Most people do not want interactive entertainment, regardless of how much fun it seems to those of us in the computer industry. This is not necessarily a bad thing. A hundred years ago, sitting quietly and reading a book or writing a letter was considered to be a more valuable pursuit than, say, playing a game of cards with friends. Today's interactive books on CD-ROM are interesting to some, but many families have found that they are used once or twice by the children, then abandoned. At $20 to $50 per book, it doesn't take long for a parent to decide not to invest in more titles.

This is not to say that the Information Superhighway is dead, just that it might not be so super. It is sure to grow, but it will almost certainly level off well before today's computer industry hopes it will. There is definitely a desire for information: look at how well many nonfiction books sell. On the other hand, look at how much better fiction sells. A great-selling nonfiction book might not even compare with the sales of the Top 10 list for fiction during the same week. Clearly, the same is true for the most popular television shows.

Today, the most popular information on the Internet could most likely be called entertainment, if we were honest about it. The most popular news groups are about sex and sports. The most popular graphic downloads, outside of pornography, have been the Shoemaker-Levy 9 comet's collision with Jupiter; let's face it, the average person looking at these pictures is far more driven by the desire for entertainment than by any scientific exploration. The most popular spots on commercial services like CompuServe and America Online tend to be the social areas.

Maybe there's a third possibility for the Superhighway: human-to-human communication. People don't usually classify the telephone as an information or entertainment tool because almost everyone uses it for both. What they really use it for is to communicate with other people (or other people's answering machines). Electronic mail has always been the most used service on the Internet, and many Internet providers find that many new clients do almost nothing else. The personal digital assistant market has so far been a complete bust, but there may be room for a few low-cost systems that do not do much more than let you send and receive email and voice messages. ■

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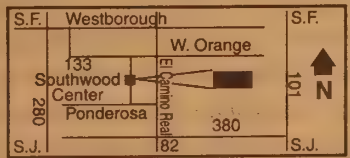

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Rally In Technology Stocks Bucks National Downtrend

High-tech stocks bucked the national downtrend in stock prices during the period September 16–October 27.

During that time span, the MicroTimes Stock Index, which monitors the financial health of the companies in the accompanying table, sprinted forward a spirited 154.81 points, or 2.91%, to conclude late October at 5478.47. Those stocks hitting new 52-week highs towered over those slumping to new 52-week lows by a 15-to-2 margin. In stark contrast, the Dow Jones Industrial Average tumbeled 58.2 points (–1.48%) during the same period en route to a close of 3875.15.

Leading all stocks higher on a percentage-gained basis last month was Silicon Graphics, which jumped 21.6% to $30.25, after hitting a new record high of $30.38 during the period. Shares of the Mountain View-based concern rocketed after the company posted a 65% gain in third-quarter net income to $41.8 million and a 42% increase in sales for the same period to $427 million. Prudential Securities raised its 1995 earnings estimates and reiterated its "buy" recommendation following SGI's strong quarter earnings report card.

Digital Equipment, attempting to pull itself up by its bootstraps, rallied $5.25 a share during the period, or 21%, to $30.25. For the third quarter ended October 1, DEC's sales rose 4% to $3.12 billion, while its losses narrowed to $130.6 million from $154.3 million in the year-ago period.

On the sell side of the ledger, Borland fell the farthest on a percentage basis, dropping 15.2% to $10.50. Two years ago, the stock traded at a record high of $83 a share. What was Borland's transgression last month? The company disappointed shareholders when its second-quarter earnings toppled 85% to $350,000 from $2.83 million in the second quarter of 1993. Sales contracted as well, to $81.3 million from $107.4 million in the comparable year-ago period.

Lotus also had a rough-and-tumble month, as it fell $5.31 a share (–12.4%) before coming to rest at $37.50. Like Borland, Lotus disappointed its followers when it posted a third-quarter loss of $1.39 a share vis-a-vis a profit of 41 cents a share last year at this time. Merrill Lynch cut its earnings estimates for the company after the bad news hit the streets. ■

EXCH	COMPANY		TICKER SYMBOL	CLOSING PRICE 09/16/94	CLOSING PRICE 10/27/94	NET CHANGE IN PERIOD	PERCENT CHANGE IN PERIOD	P/E RATIO	ANNUAL DIVIDEND RATE	ANNUAL DIVIDEND YIELD	ANNUAL HIGH	ANNUAL LOW
	SOFTWARE											
OTC	Adobe	(H)	ADBE	34.75	36.38	1.63	4.68	26	0.20	0.55	38.50	19.00
OTC	Autodesk	(H)	ACAD	62.25	67.75	5.50	8.84	26	0.48	0.71	70.00	37.00
OTC	Borland		BORL	12.38	10.50	-1.88	-15.15	-	0.00	0.00	18.25	8.50
OTC	Informix	(H)	IFMX	23.25	27.25	4.00	17.20	30	0.00	0.00	28.75	14.25
OTC	Lotus		LOTS	42.81	37.50	-5.31	-12.41	-	0.00	0.00	86.50	29.75
OTC	Microsoft	(H)	MSFT	56.88	61.63	4.75	8.35	31	0.00	0.00	61.63	38.00
OTC	Novell		NOVL	15.31	17.00	1.69	11.02	22	0.00	0.00	26.63	13.38
OTC	Oracle	(H)	ORCL	44.00	44.19	0.19	0.43	42	0.00	0.00	46.50	26.25
OTC	Software Publishing		SPCO	4.75	5.38	0.63	13.16	-	0.00	0.00	8.63	3.00
OTC	Symantec		SYMC	15.88	16.81	0.94	5.91	99	0.00	0.00	20.25	9.88
	HARDWARE											
OTC	Apple	(H)	AAPL	36.38	42.75	6.38	17.53	16	0.48	1.12	43.25	24.63
OTC	AST Research	(L)	ASTA	14.00	12.13	-1.88	-13.39	7	0.00	0.00	33.00	10.38
NYS	Compaq		CPQ	37.63	38.75	1.13	2.99	15	0.00	0.00	39.88	21.13
NYS	Digital Equipment		DEC	25.00	30.25	5.25	21.00	-	0.00	0.00	38.63	18.25
OTC	Dell	(H)	DELL	37.38	41.88	4.50	12.04	24	0.00	0.00	43.50	19.13
NYS	Hewlett-Packard	(H)	HWP	91.13	95.88	4.75	5.21	17	1.20	1.25	95.88	70.13
NYS	IBM	(H)	IBM	71.00	74.13	3.13	4.40	21	1.00	1.35	76.13	45.75
NYS	Silicon Graphics	(H)	SGI	24.88	30.25	5.38	21.61	30	0.00	0.00	30.38	18.75
OTC	Sun Microsystems	(H)	SUNW	27.88	32.25	4.38	15.70	14	0.00	0.00	33.38	18.25
NYS	Xerox	(H)	XRX	105.13	102.00	-3.13	-2.97	18	3.00	2.94	112.75	78.38
NYS	Tandy		TAN	42.75	43.75	1.00	2.34	17	0.60	1.37	50.75	30.75
	CPU'S											
NYS	Advanced Micro Devices		AMD	30.00	25.88	-4.13	-13.75	8	0.00	0.00	31.75	16.75
OTC	Intel		INTC	66.88	60.50	-6.38	-9.53	11	0.24	0.40	73.50	55.88
NYS	LSI Logic	(H)	LSI	35.13	39.38	4.25	12.10	24	0.00	0.00	40.50	13.00
NYS	Motorola	(H)	MOT	54.50	56.38	1.88	3.44	24	0.28	0.50	57.38	42.13
	COMMUNICATIONS											
NYS	AT&T		T	54.88	53.13	-1.75	-3.19	18	1.32	2.48	58.38	49.50
NYS	BellSouth Corp.	(L)	BLS	57.63	51.38	-6.25	-10.85	19	2.76	5.37	63.50	50.75
OTC	MCI		MCIC	24.75	22.50	-2.25	-9.09	17	0.05	0.22	29.13	21.38
NYS	Northern Telecom	(H)	NT	37.25	35.50	-1.75	-4.70	31	0.36	1.01	37.75	26.00
NYS	Pacific Telesis		PAC	33.13	31.25	-1.88	-5.66	28	2.18	6.98	34.50	29.41

KEY: NYS = NEW YORK ASE = AMERICAN OTC = OVER THE COUNTER
(H) = NEW HIGH REACHED IN PERIOD (L) = NEW LOW REACHED IN PERIOD

MARKET DIARY:

ADVANCES....................	19
DECLINES....................	11
UNCHANGED...............	0
NEW HIGHS..................	15
NEW LOWS..................	2

MOST ACTIVE ISSUES:

LARGEST DOLLAR GAINER..................	Apple..................................	$	6.38
LARGEST DOLLAR LOSER....................	Intel....................................	$	-6.38
LARGEST PERCENTAGE GAINER..........	Silicon Graphics..................		21.61 %
LARGEST PERCENTAGE LOSER............	Borland..............................		-15.15 %

	CLOSE 09/16/94	CLOSE 10/27/94	NET CHANGE IN PERIOD	PERCENT CHANGE IN PERIOD
MICROTIMES STOCK INDEX	5323.66	5478.47	154.81	2.91
DOW JONES INDUSTRIAL AVERAGE	3933.35	3875.15	-58.20	-1.48
STANDARD & POOR'S 500 INDEX	471.19	465.85	-5.34	-1.13
N.Y.S.E. COMPOSITE	259.77	255.57	-4.20	-1.62
NASDAQ COMPOSITE	777.91	767.47	-10.44	-1.34

CLOSING QUOTES FOR GRAPH:

DATE	MICRO TIMES	DOW JONES
04/05/94	4878.26	3675.41
04/29/94	4639.86	3668.31
05/27/94	4709.29	3757.14
06/24/94	4238.94	3636.94
07/22/94	4577.29	3735.04
08/19/94	5070.19	3755.11
09/16/94	5323.66	3933.35
10/27/94	5478.47	3875.15

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REALIZABLE FANTASIES • BY JIM WARREN

The Death Of Freedom And Privacy In America

George Orwell's *1984*—With Its Dark Predictions Of The Future—Was Wrong. He Missed The Date By Ten Years.

They've done it!

The bastards have finally done it!

This isn't a realizable fantasy. It's a *realized* nightmare!

Last month, the myopic, naive, irresponsible, obedient sheep in Congress began the demolition of what little balance-of-power they pretended to retain over the executive branch. And they probably don't even realize what they did.

They let self-serving bureaucrats and the incumbent administration sucker them into betraying all of the innocent citizens and law-abiding businesses of this nation—in a manner that was just as much sought by the previous administration (early in 1991). The Beltway elite screwed all of us, naively thinking they were merely spending half a billion dollars for the convenience of a few bureaucrats.

They mandated that a draconian system be created for monitoring everyone in this nation—a system that will also guarantee near-omnipotent political power to all *INCUMBENT* local, state, and federal politicians and officials, at least for all who are willing to exploit their government positions for political or personal gain.

> If this law had been implemented twenty-five years ago, Nixon's staff wouldn't have needed to break into Democratic Headquarters at the Watergate.

In The Dark Of Night

This is not a drill.

In the evening of October 5, our "representatives" in the House unanimously voted to require and fund a national system for "Interception of Digital and Other Communications," passing H.R. 4922. It was fast-tracked through with minimal hearings, with public access to crucial testimony prohibited.

About 9:30 pm on October 10, our senators concurred, rushing to adjourn in time to go play or campaign for reelection. At press deadline, H.R. 4922 awaits President Clinton's signature to become law—and it was his appointees who most zealously sought this law.

Mark this on your calendars:

October, 1994, was the birth of the death of political freedom and personal privacy as we know it in Amerika. Here's how:

Keystroke Power To Wiretap Us All

H.R. 4922 requires that every public and private wired and wireless, "telecommunications [common] carrier shall ensure that its equipment, facilities, or services...are capable of—(1) expeditiously isolating and enabling the government, pursuant to a court order *or other lawful authorization,* to intercept...all wire and electronic communications...concurrently with their transmission...; delivering intercepted communications and call-identifying information to the government...such that they may be transmitted by [government equipment] to a location other than the premises of the carrier" (emphasis added).

This system is to give "authorized" agencies the equipment and access they need to automatically wiretap almost any electronic communication in the nation, from any equipped government site, at the stroke of a key, undetectably by citizens.

The technology to do this is already built-in to modern central-office switches, but its use has been limited to phone technicians for systems monitoring and maintenance. The phone companies have refused to connect their maintenance-monitoring circuits to external government equipment—without payment and this legal mandate.

Incidentally, the bill defines "government" as, "the government of the United States and *ANY* agency or instrumentality thereof, the District of Columbia, ...*AND* any State or political subdivision thereof authorized by law to conduct electronic surveillance" (emphasis added).

Note: The Electronic Frontier Foundation has the full text of the bill available online by ftp (ftp.eff.org, /pub/ ...), gopher (gopher.eff.org, 1/ ...), or WWW and Mosaic (http.eff.org/pub...) as "EFF/Policy/Digital_Telephony/digtel94.bill"—along with extensive ancillary information.

$500,000,000.00 Of Your Tax Dollars At Work

Not only will H.R. 4922 make *your* telephone "wiretap-ready," but you get to pay for it. The bill allocated funds for the first four years, to pay wired and wireless communications companies to begin implementing the system—a $500,000,000 taxpayers' down-payment to guarantee government Surveillance of the People, by the Bureaucrats, for the Incumbents.

Some communications experts have estimated that it will cost three to six *billion* dollars—just like the wild cost-overruns of so many other high-tech systems that Congress authorizes.

Even for the "paltry" half-a-billion—if a government agent is platinum-plated and costs $100,000 per year, that would pay for 1250 new agents for four years.

Geez! How many wire-taps do they want—that 1250 additional high-priced

Realizable Fantasies *continued...*

agents couldn't do the old-fashioned way? (Admittedly, they'd have to buy some $500 ISDN butt-sets, rather than the $90 old-fashioned units that linemen use to check analog lines.)

Ratepayers Pay To Be Wiretapped?

Just in case Congress doesn't fund the rest of the system, H.R. 4922 instructs the Federal Communications Commission to establish rules that "meet the...requirements [for wiretapping] by cost-effective methods...[and] minimize the cost of such compliance on residential ratepayers." Apparently, business rate-payers may have to pick up the costs—and will pass it along to their customers in higher prices, just like all business taxes.

If tax funds run out, the communications carriers won't have to make their systems wiretap-ready, "until the equipment, facility, or service is replaced or significantly upgraded or otherwise undergoes major modification." And of course, those costs are recovered from rate-payers.

Who Has The Power? Citizens Can't Find Out!

The "*other lawful authorization*" phrase is particularly important. The bureaucratic pretense is that this system is to aid law enforcement, but "other lawful authorization" is added, throughout the bill. And us hick citizens can't find out what all those other lawful authorizations are—they're classified or secret.

What "other lawful authorizations" are there for snooping and peeping by the IRS, DEA, NSA, CIA, Defense Intelligence Agency, Secret Service, etc.?

Would any of those agencies push their secret limits? Please recall the Secret Service's 1990 Operation Sun Devil raids on never-prosecuted possible "crackers," where the SS "arrested the computers"—that was their phrase. Since computers have no constitutional protections, they were forfeited because they were not presumed innocent, and their owners couldn't afford the legal battle to prove the machines had never been used for any unauthorized purpose.

Power To Everyone Willing To Abuse It

Last summer, Internal Revenue Service officials confirmed in public Senate hearings that more than thirteen hundred IRS employees have been investigated on suspicion of making unauthorized use of their authorized access to private citizen data in IRS computers and files. In just the last five years. In just that one federal agency. Sometimes for personal curiosity; sometimes for covert sale of citizens' confidential disclosures.

Both Lyndon Johnson and Richard Nixon were known to have used the IRS to attack their political opponents.

How many thousands of federal, state, and local agencies does H.R. 4922's "government" include? How many tens of thousands of federal, state, and local staff

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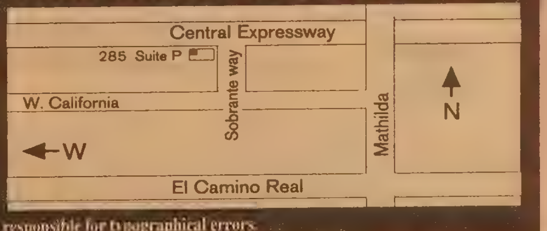

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Realizable Fantasies *continued...*

will have authorized access to this pervasive surveillance power? How many thousands of political appointees control those agencies—and are controlled by incumbent politicians?

How many hick sheriffs or local party bosses or nosy night staff are likely to make unauthorized use of this congressionally mandated snoop-n-peep technology against boy- and girlfriends, family members, personal enemies, business competitors, and—most dangerously—political opponents?

> The bureaucratic pretense is that this system is to aid law enforcement, but "other lawful authorization" is added, throughout the bill.

Richard Nixon Would Have Used It!

If this law had been implemented twenty-five years ago, Nixon's staff wouldn't have needed to break into Democratic Headquarters at the Watergate. They could have just had later-convicted attorney general John Mitchell use his position to implement all the covert wiretaps they wanted—all over the nation—from the safety and convenience of their Beltway offices. (The bill makes the attorney general responsible for much of the system.)

The Aldridge Ames Surveillance System

Aldridge Ames is the former top-level CIA agent who sold US secrets to the Russians for years. Due to his former position—especially noting the proven lack of checks and balances within the CIA—he would very possibly have been placed in charge of this United States Wiretap System.

Using its power, Ames could certainly have made many more millions. And he could have probably wiretapped the CIA's own internal investigative staff, allowing him to escape when they first began to suspect him.

J. Edgar Hoover Would Have Loved It!

The FBI's founding director served under—and *over*—eight presidents.

For decades, the power of the FBI to conduct surveillance and wiretaps—the old-fashioned, difficult, expensive kind that required laborious field installation and constant on-site monitoring by agents—was abused and exploited, as has now been extensively documented in books and multihour PBS documentaries.

Even without this monumentally-more-powerful wiretap system that has now been forced on all of us, the FBI director exploited the Bureau's powers for decades, to enhance his personal power and the power and funding of the Bureau. The FBI's then-limited surveillance powers were used to build dossiers for blackmailing the nation's most-powerful politicians. (Ahah! Maybe *that's* how H.R. 4922 was rammed through!)

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Realizable Fantasies *continued...*

No political leader—then or now—dared challenge the FBI. All feared the Bureau's massive files on themselves and on their political allies, often compiled using unauthorized wiretaps. E.g., when Attorney General Robert Kennedy authorized three wiretaps on Martin Luther King, Jr., the FBI promptly installed at least fourteen taps. When President Lyndon Johnson prohibited wiretaps except for national security, the FBI continued tapping King—no mere president was going to stop the FBI.

When Hoover died in 1972, his personal aides destroyed thirty-five file *cabinets* of his personal dossiers—presumably including drawers of secrets used to control powerful politicians and national leaders. Even so, Freedom-of-Information researchers later uncovered thousands of pages of embarrassing records on everyone from Dwight Eisenhower and Lyndon Johnson to John F. Kennedy and Martin Luther King, Jr.

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Further abusing their surveillance ability, the FBI compiled embarrassing dossiers on a huge array of Hollywood leaders, including Bing Crosby, John Wayne, Cary Grant, Henry and Jane Fonda, Desi Arnaz, and of course, Marilyn Monroe. They compiled more than six hundred pages on Elvis Presley alone. And while those files existed, Hollywood films were never critical of the FBI.

If Hoover had access to this system, the FBI would probably have had to destroy an entire building—*full* of file cabinets.

Why Hasn't The Press Howled?

Interestingly, I don't recall reports that the FBI compiled dossiers on leading newspaper publishers, editors, nor leading members of the press. Given the massive power of "the fourth estate," that's rather surprising.

It has been frustrating and infuriating, however, that the mainstream print and broadcast press have given virtually no coverage to this bill—especially given its Orwellian implications for the nation. And the computer trade-press hasn't done much better.

More than likely, most of the press was just too technically naive to understand the realistic ramifications, much less figure out how to explain the issues in a manner that could compete with *important* stories about Tonya Harding and O.J. Simpson.

Not Much Hope

Once they fully realize the political power of what they have created, it is unlikely that the incumbent majority party in Congress will dare to challenge the bureaucrats who could, by then, be monitoring their every communication—much less vote to cancel this Aldridge Ames Memorial Peeping Program. And even if they tried, the president who controls it would surely veto any attempt to degrade his or her powers.

Perhaps our only hope is that government agencies or Beltway contractors will try to implement significant parts of the system, directly—resulting in technology debacles similar to the failed air traffic control system, the failed IRS automation system, and the failed Department of Defense acquisitions payment system. Unfortunately however,

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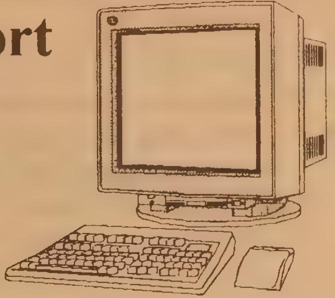

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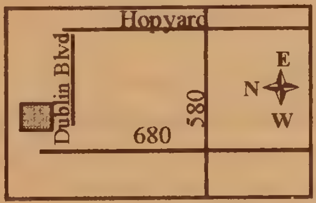

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Realizable Fantasies *continued...*

they appear to be planning to pay the phone companies to implement most of the system—and the US phone system is one of the best in the world.

There is one other somewhat perverse hope: Perhaps some of the nation's more adept phone phreaques and computer crackers will be the first to penetrate this national surveillance system—even *before* it's done by some well-funded foreign spies, pursuing industrial or political espionage. (Do you know of *any* public phone system in the US that has not been cracked?)

And perhaps the crackers will follow their tradition of broadcasting their access methods all over the nets. Then *everyone* would have equal surveillance tools; not just incumbent officials. Maybe *that* would awaken our nearsighted government zealots to what they have done.

Predictable Futures

Please note that switching current analog systems to ISDN or other digital systems in the future would certainly classify as "significant upgrading." Thus, it appears that the bill forces phone companies to include wiretap access in all current systems that they have not yet converted to digital.

And if the carrier also supplies the desksets for the customer sites, then they will have to upgrade customers' desksets and/or handsets. Is it too much of a stretch for the attorney general to declare that implementing *their* wiretap system requires desksets that can be remotely turned on—even when they are on-hook? Of course, this would only be used whenever authorized by law—or activated by any staffer with access.

And video-phones are predictably in our interactive communications future. They require a camera in the user's deskset—in the bathroom, bedroom, or boardroom. It's clearly a significant upgrade.

As cable carriers move in to compete with the phone companies, they will obviously fall under the control of this legislation. What are you watching, and when are you watching it?

What agencies will successfully justify their need for access to this surveillance system? The Bush administration's drug forfeiture funds entirely paid for development of the Clinton administration's decoy surveillance system, the Clipper chip—outside of congressional oversight or funding. The DEA is making billions of dollars from seizing money and property that they allege might somehow be related to drug use, transportation, or sale. Using this system and automated voice-recognition, they could find billions more. How about social services agencies going after child-support scofflaws—already used to justify requiring the Social Security number on drivers' licenses?

Once surveillance is so *easy*, how might the radical Right and the Politically Correct possibly use it to monitor "nasty" discussions or incorrect speech?

Of course, all of this is ridiculous paranoia—as unreasonable as it would be to believe that a sitting president would authorize break-ins to an opposing party's headquarters, or that a director of the FBI would monitor Elvis Presley and John Wayne.

Too Much Power For Those In Power

There is no question that law enforcement and other security agencies need the ability to conduct reasonable wiretaps—even if they *did* ignore the wiretap information they received prior to the World Trade Tower bombing. It is equally true that they will need to buy new equipment to be able to tap ISDN and other digital communications—for hundreds of dollars each. And we would all like to see good government do its work efficiently. (A half-billion dollars for a "few hundred" short-term wiretaps.)

But this national citizen surveillance system is *much* too powerful to give to government as a whole, much less vesting its control exclusively in the executive branch. It is too easy to abuse—just as the FBI surveillance power was abused for decades.

It is most especially dangerous without ample oversight. At the *least*, it should include automated monthly reports from the communications carriers to the legislative and judicial branches—just like phone bills, and generated just as automatically—detailing exactly who is doing what, to whom, with which part of this awsome authority.

But then again, executive branch incumbents might not want that kind of automated surveillance of what *they* do. ■

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○ 14" ○ 15" ○ 17" ○ Non Interlace ○ 28 DPI
○ 20" ○ 21" ○ Multisync

HARD DISK DRIVE: ○ 100MB+ ○ 300MB+ ○ 500MB+ ○ 1GB+ ○ 4GB+
○ IDE ○ SCSI ○ 200MB+ ○ 400MB+ ○ 700MB+ ○ 2GB+ ○ 8GB+

FLOPPY DRIVE: ○ 1.44MB and/or ○ 1.2MB

FAX MODEM: ○ Internal ○ External
○ 9600bps ○ 14400bps ○ 28800bps

CASE TYPE: ○ Mid Tower ○ Desktop ○ Full Tower

VIDEO CARD RAM ○ 512KB ○ 1MB ○ 2MB ○ 3MB ○ 4MB

POINTING INPUT DEVICES: ○ Any Mouse ○ MS Mouse ○ Keyboard
○ Serial ○ Bus ○ PS2 ○ Trackball ○ Joystick ○ Ball Point ○ Pen

OPERATING SOFTWARES NEEDED: ○ DOS ○ OS2 ○ Mac ○ UNIX ○ MS Windows

STEP THREE: MULTIMEDIA UPGRADE

○ Please Add To Step 1 & 2 Quotation ○ Please Quote Me Separately

CD ROM DRIVE: ○ Internal ○ IDE ○ SCSI ○ External

CD ROM TITLES INCLUDED: ○ 1-5 ○ 5-10 ○ 11+

SPEED ○ 2X ○ 3X ○ 4X

○ BRAND NAME ○ No Brand Name Preference

CD ROM Brand Name and Model Number

SOUND CARD ○ 16Bit ○ 32Bit ○ 64Bit

SPEAKERS ○ Less Than 25W ○ 25 to 50W ○ 50 to 75W ○ More Than 75W

STEP FOUR: NOTEBOOK SECTION (Please Note You Must Make Choices In Steps 1 & 2 To Complete Step Four.)

SCREEN TYPE: ○ Mono ○ Dual Scan Color ○ Active Color

PCMCIA SLOT: ○ Type I ○ Type II ○ Type III ○ Type IV

○ Audio Capable ○ Docking Station ○ Extra Battery ○ Fax Modem

STEP FIVE: NETWORKING NEEDS:

○ Please Contact Me on My Networking Needs Indicated Below

○ Software ○ Hardware ○ Consultation ○ Design ○ Installation ○ Administration
○ Users 2 to 10 ○ Users 10 to 50 ○ Users Over 50 ○ Novell ○ Lantastic ○ MS NT ○ Apple Talk ○ MS Workgroups

STEP SIX: UPGRADES and PERIPHERALS.

○ Include Step Six Choices To The Above Quotation

○ Ink Jet Printer ○ Laser Printer ○ Accelerator
○ Color Printer ○ Hand Scanner ○ Tape Backup
○ Dot Matrix Printer ○ Flat Bed Scanner ○ Digitizer

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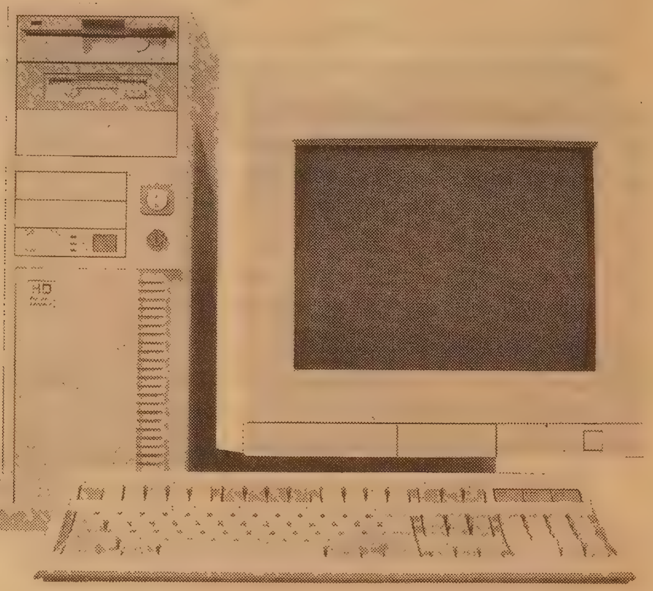

- ***Intel Pentium 90MHz Processor***
- *Intel Neptune Chipset*
- *256KB External Cache*
- *8MB 72-pin RAM (Max 128MB)*
- *1.2MB FDD*
- *1.44MB FDD*
- *540 MB IDE HDD*
- *PCI Enhanced IDE Controller*
- *2-16550 High Speed Serial Ports*
- *1 Parallel Port*
- *Diamond Stealth 64 PCI Video Card w/2MB DRAM*
- *Zoltrix 14400 bps High Speed Internal Fax Modem*
- *Mid Tower Case w/230W Power Supply*
- *15" 1280x1024 Non-interlaced Flat Screen Monitor, .28 dpi*
- *101-key Keytronic Keyboard*
- *Microsoft Serial Mouse*
- *Microsoft DOS 6.22*
- *Microsoft Windows 3.11*
- *Free Mouse Pad*
- *Free America Online*

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PENTIUM PCI Online System

- ***Intel Pentium 60MHz Processor***
- *Intel Mercury Chipset*
- *256KB External Cache*
- *8MB 72-pin RAM (Max 128MB)*
- *1.2MB FDD*
- *1.44 MB FDD*
- *540 MB HDD*
- *PCI Enhanced IDE Controller*
- *2-16550 High Speed Serial Ports*
- *1 Parallel Port*
- *Diamond Speedstar 64 PCI Video Card w/2MB*
- *Zoltrix 14400 bps High Speed Internal Fax Modem*
- *Mid Tower Case w/230W Power Supply*
- *14" Non-interlaced Monitor*
- *101-key Enhanced Keyboard*
- *3 Button Serial Mouse*
- *Microsoft DOS 6.22*
- *Microsoft Windows 3.11*
- *Free Mouse Pad*
- *Free America Online*

$1975

- ***Intel Pentium 90MHz Processor***
- *Intel Neptune Chipset*
- *256KB External Cache*
- *8MB 72-pin RAM (Max 128MB)*
- *1.44MB FDD*
- *730 MB Enhanced IDE HDD*
- *Panasonic Doudle Speed Internal CD-ROM*
- *PCI Enhanced IDE Controller*
- *2-16550 High Speed Serial Ports*
- *1 Parallel Port*
- *Diamond Stealth 64 PCI Video Card w/2MB DRAM*
- *Sound Blaster 16 Stereo Sound Card*
- *Zoltrix 14400 bps High Speed Internal Fax Modem*
- *Mid Tower Case w/230W Power Supply*
- *15" 1280x1024 Non-interlaced Flat Screen Monitor, .28 dpi*
- *101-key Keytronic Keyboard*
- *Microsoft Serial Mouse*
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- *8MB 72-pin RAM (max. 128MB)*
- *2-16550 High Speed Serial Ports*
- *1 Parallel Port*
- *1.2MB FDD*
- *1.44MB FDD*
- *540MB SCSI II HDD*
- *NCR PCI SCSI II Controller*
- *Diamond Stealth 64 PCI/2MB DRAM*
- *Mid Tower Case w/ 230W Power Supply*
- *15" Non-interlaced Monitor, .28 dpi*
- *101-key Keytronic Keyboard*
- *Microsoft Serial Mouse*
- *Microsoft DOS 6.22*
- *Microsoft Windows 3.11*
- *Free Mouse Pad*

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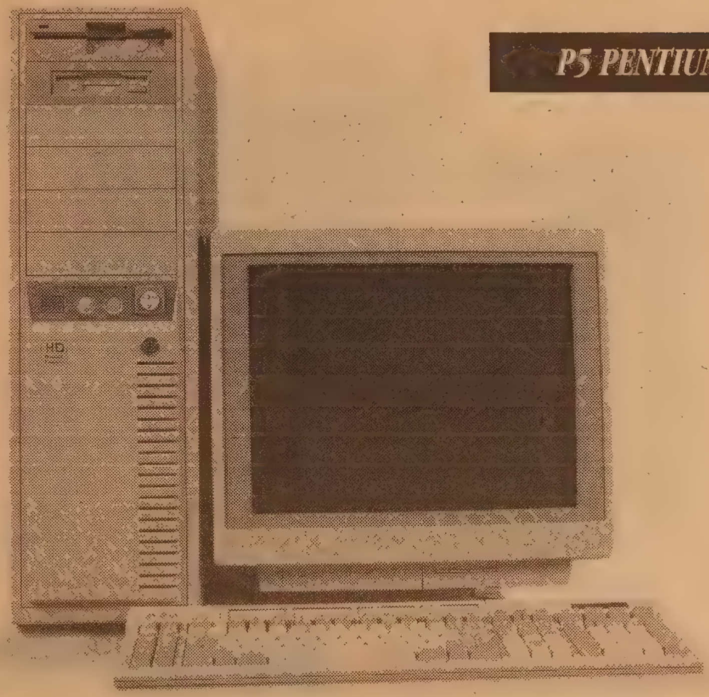

P5 PENTIUM Processor PCI System

- *Intel Pentium Processor*
- *Intel Mercury Chipset*
- *16KB Internal Cache*
- *256KB External Cache*
- *8MB 72-pin RAM (Max 192MB)*
- *1.2MB FDD*
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- *NCR PCI SCSI II Controller*
- *540MB SCSI II HDD*
- *2-16550 UART High Speed Serial Ports*
- *1 Parallel Port*
- *Diamond Stealth 32 PCI/1MB*
- *Mid Tower Case w/230W Power Supply*
- *15" 1280x1024 Non-interlaced Flat Screen Monitor, .28 dpi*
- *101-key Keytronic Keyboard*
- *Microsoft Serial Mouse*
- *Microsoft DOS 6.22*
- *Microsoft Windows 3.11*
- *Free Mouse Pad*

60MHz ***$2195***

66MHz ***$2315***

PENTIUM PCI Powerstation

- *Intel Pentium Processor*
- *16KB Internal Cache*
- *256KB External Cache*
- *16MB 72-pin RAM (Max 128MB)*
- *1.2MB FDD, 1.44MB FDD*
- ***NCR PCI Wide SCSI Controller (Transfer Rate up to 20MB/Sec)***
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- *1 Parallel Port*
- *Mid Tower case w/230w power supply*
- ***17" IMPRESSION** 1280x1024 Non-interlaced Flat Screen Monitor*
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- *40W Stereo Speaker*
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- *Microsoft Windows 3.11*
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- *4MB RAM*
- *1.44MB FDD*
- ***424MB IDE HDD***
- *VLB 2H/2F IDE Controller*
- *2S, 1P, 1G Ports*
- *32-bit VL-B Graphic Accelerator Card/1MB*
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- *14" Non-Interlaced Monitor, .28 dpi*
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- *3 Button Serial Mouse*
- *Microsoft DOS 6.22*
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- *Free Mouse Pad*

Microsoft Upgrade Kit

- *New Sony IDE Drive CDU 55E*
- *True SB compatible 16 Sound Card*
- *Amplified Stereo Speaker*
- *Microsoft Encarta Encyclopedia*
- *Microsoft Golf*
- *Microsoft Baseball*
- *Microsoft Works*
- *Microsoft Money*
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- *Space Shuttle*

SX-33	***$1325***
DX-33	***$1435***
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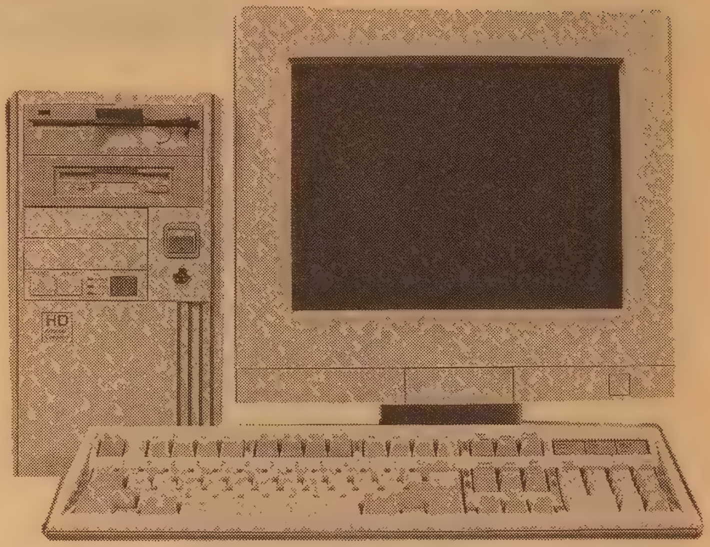

Intel 486 PCI Local Bus System

- *Intel DX-486 Processor*
- *ZIF Socket for Upgrade to Pentium OverDrive*
- *8KB Internal Cache*
- *256KB External Cache (max. 512KB)*
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- *Built-in NCR 32-bit PCI SCSI Controller*
- *2 Serial Ports*
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- *540MB SCSI HDD*
- *Diamond Stealth 32 PCI/1MB*
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- *101-key Keytronic Keyboard*
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DX-33	***$1570***
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Green VESA Local Bus System

- *Energy-Efficient System*
- *Saves up to 70% on Energy Consumption*
- *VESA Standard Local Bus*
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- *128K Cache*
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- *101-key Enhanced Keyboard*
- *3 Button Serial Mouse*
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- *New Sony IDE Drive CDU 55E*
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- *Microsoft Encarta Encyclopedia*
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- *Microsoft Entertainment Pack (7 Games and MS Home Sampler)*
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DX2-50	***$1515***
DX2-66	***$1555***

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- Compton's Encyclopedia
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- Microsoft Bookshelf MPC
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- Microsoft Works MPC
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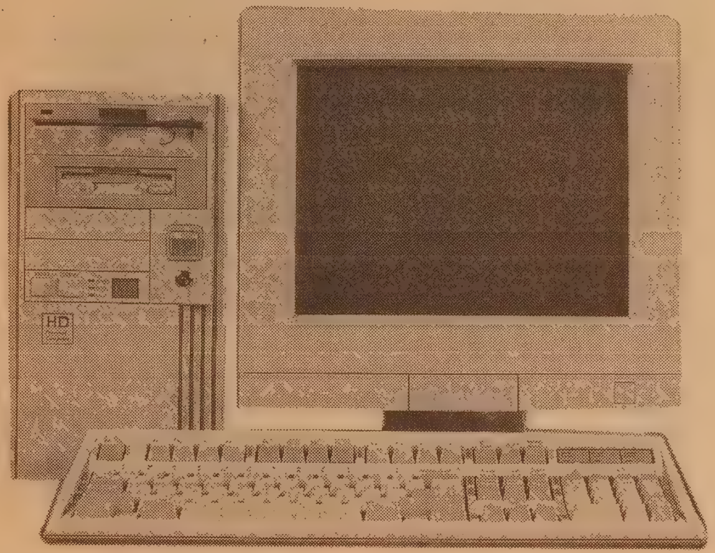

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Creative Lab

Edutainment CD

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- Microsoft Office Professional 4.3
- Microsoft Encarta™ Encyclopedia
- Microsoft Sound System 2.0
- Creative VoiceAssist™
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- Audio Compression Software and Hardware
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External	***$369***

PLEXTOR

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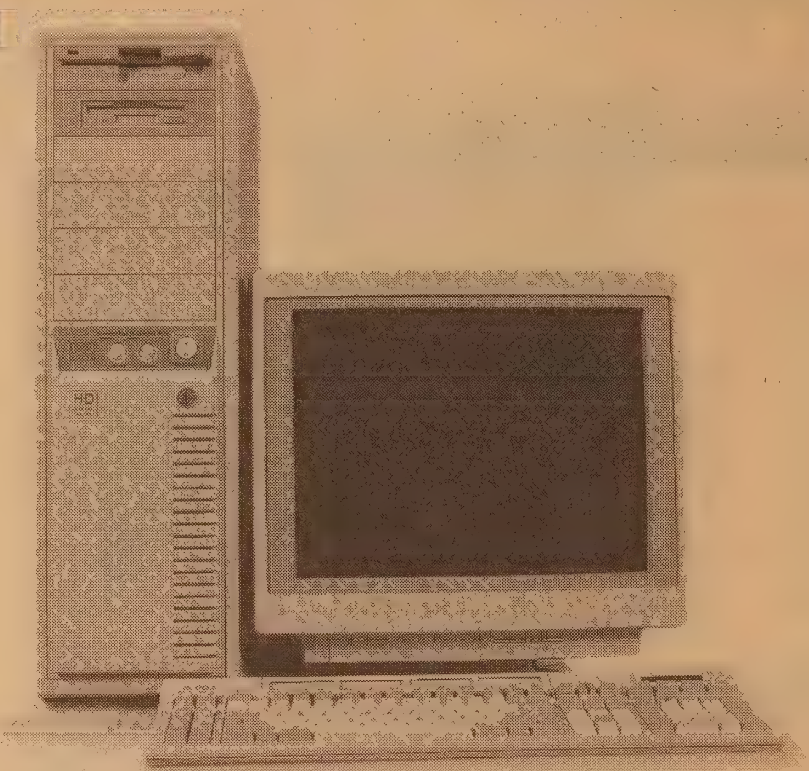
•3028 SCSI CD ROM 240ms	***$239***
•DM-5028 External w/Caddy	***$349***

TEAC
- *4X Internal CD-ROM*
- *AT-Interface Card* ***$339***

PANASONIC/CR562 CD ROM
- *Includes Controller*
- *320ms/300KB/sec*
- *64K Cache*
- *Double Speed* ***$145***

SONY/New Multi Speed 300KB/Sec
- *Controller Card*
- *Cables and Software* ***$139***

Mitsumi Double Speed CD-ROM
$119



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•Sound Blaster 16 Basic	***$99***
•Sound Blaster 16 SCSI 2/with ASP	***$169/198***
•Sound Blaster 16 MultiCD/with ASP	***$139/179***
•Video Blaster	***$319***
•Wave Blaster	***$179***

•Gallant

•MIDI Kit	***$39***
•Gallant 4000 w/Interface, Speaker & Microphone	***$69***
•Gallant 5000 16 Bit Stereo w/Interface, Speaker & Microphone	***$89***
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•Wave Table	***$89***

•Logitech

•Logitech SoundMan 16, 16-bit Sound Card	***$98***

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NETWORK SYSTEMS

Design, Consultation, Installation, Trouble Shooting, Hardware & Software Configuration, Service & Support

HD Workstation

- *Desktop Case w/ 200W Power Supply*
- *Intel 486SX 25 Processor*
- *ISA/VESA Motherboard*
- *4MB RAM (Max 32MB)*
- *128K High Speed External Cache (Max 256K)*
- *TEAC 1.44MB Floppy Drive*
- *VESA Local Bus 32-bit Video Card/1MB*
- *14" Non-interlaced Monitor*
- *101 Enahnced Keyboard*
- *Microsoft Serial Mouse*
- *Free Mouse Pad*
- *NE-2000 Compatible Ethernet Card (Coax or 10Base-T)*

$845

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HUB

4 Port 10 Base-T Hub Card	*$150*
8 Port 10 Base-T Hub	*$215*
12 Port 10 Base-T Hub	*$485*

PENTIUM/HD File Server

- *Tower Case w/ 300W Power Supply*
- *Intel Pentium 90MHz Processor*
- *PCI/EISA Motherboard*
- *16MB Ram 72PIN (Max 128MB)*
- *256K High Speed External Cache (Max 512KB)*
- *Teac 1.2MB Floppy Drive*
- *Teac 1.44MB Floppy Drive*
- *2.1GB Wide SCSI Hard Disk*
- *Adaptec 2940W PCI Wide SCSI Controller Kit*
- *M.G.P Card*
- *14" Mono monitor*
- *101 Key Keytronic Keyboard*
- *Microsoft Serial Mouse*
- *Free Mouse Pad*

$3995

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Terms and conditions: *• 30 days return policy • 1 year parts warranty • Major credit cards accepted • No surcharge for VISA, MC, AE and Discover Cards • Quality PO's accepted from Academic, Corporate and Public Institutions • APO's welcome • Shipping charge not refundable • Return shipments must be insured, prepaid and bear an RMA# on the shipping label • Price does not include shipping • Price are subject to change without notice • Component warranties offers and claims are handled by the manufacturer • Components Compatibility is not guaranteed • No return on used items • All open returns are subject to 15% restocking fee • No exchanges or refunds on cd's will be replaced with the same item only... • Allow 14 days to process refund. • Not Responsible for typographical errors.*

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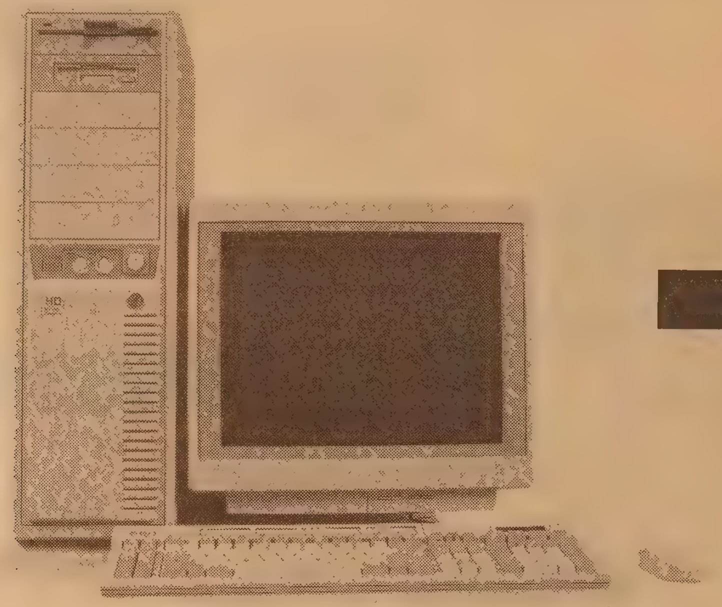

Ethernet Adapters

- *DANPEX*

PCI Ethernet Card	***$165***
EN-2000B 16Bit BNC	***$65***
EN-2000BT 16Bit Combo	***$85***
EN-2000PB 16Bit Soft Set BNC	***$60***
EN-2000PT 16Bit Soft Set 10BT	***$60***
EN-2000P3 16Bit Soft Set Combo	***$75***
EN-6000B Pocket Lan BNC	***$137***
EN-6000T Pocket Lan 10BT	***$140***
EN-400I 4Port 10BT Hub Card	***$150***
EN-800A 8Port 10BT Hub	***$215***
EN-1212A 12Port 10BT Hub	***$485***

- *Accesories*

RG58 Coax Cable BNC 10'	***$8.00***
RG58 Coax Cable BNC 25'	***$10.00***
RG58 Coax Cable BNC 50'	***$13.00***
RG58 Coax Cable BNC 100'	***$25.00***
BNC Straight Adapter F-F	***$1.80***
BNC T Adapter F-M-F	***$3.80***
BNC Terminator 50 OHM	***$2.20***
BNC Connector Crimp on RG58	***$1.80***
BNC Connector Mold	***$2.00***
Gender Change DB25 F/F, M/M	***$4.00***
Gender Change Cent .36 F/F, M/M	***$7.00***
Gender Change DB25 to Cent .36	***$5.00***
Gender Change DB9 to DB25	***$4.00***
Gender Change DB9 to Din6	***$5.00***
RG58 A/U Coax Cable 1000	***$125.00***
RJ45 8 Twist Pair Cable 1000'	***$110.00***
RJ45 8 Twist Pair Cable 10'	***$3.50***
RJ45 8 Twist Pair Cable 25'	***$4.50***
RJ45 8 Twist Pair Cable 50'	***$9.50***

- *Microdyde/Novell*

NE-2000 Plus 16bit	***$115***
NE-2000T Plus	***$115***
NE-3200 EISA 32bit Coax/TP	***$539***
NE-2000 Plus 3	***$129***

Ethernet Adapters

- *Compatible*

NE-1000 8bit Coax	***$59***
NE-2000 16bit Coax/TP	***$60***
NE-2000 16bit Combo	***$75***
NE-2000 16bit 5 pack	***$235***
EP-888A Pocket Ethernet BNC + 10BT	***$145***
EP-808A 8Port Ethernet HUB	***$199***
EC-812 12Port Ethernet HUB	***$449***
EE-840 32Bit EISA Ethernet	***$289***

- *Intel*

Etherexpress 16 16bit 5pack/20pack	***$575/1995***
Intel 16bit Ethernet Combo PCLA 8100	***$129***
Intel 16bit Ethernet BNC PCLA 8110	***$115***
Intel 16bit Ethernet 10BT PCLA 8120	***$115***
Intel 16bit Ethernet Combo PCLA 8105/Flash	***$159***

- *3COM*

3C503 Etherlink II 16 Coax/TP	***$167***
3C503 Etherlink II 16 5pack	***$785***
3C507 Etherlink II 16 Coax/TP	***$295***
3C509 Etherlink III Coax/TP	***$117***
3C509 Etherlink III 5pack	***$528***

- *SMC*

Ether card plus elite 16 Coax/TP	***$119***
Elite ultra 16bit Coax/TP	***$115***
Elite ultra 16bit 6pack/24pack	***$675/2375***
SMC Ultra 16 Bit Ethernet Combo	***$135***

- *DLINK*

DE-600 TP Pocket Ethernet 10BT	***$199***
DE-205 TP 16Bit Ethernet 4 Port 10BT	***$290***

- *INFO Express Ethernet Adapter*

16Bit BNC/10TP	***$60***
32Bit VLB/Combo	***$139***

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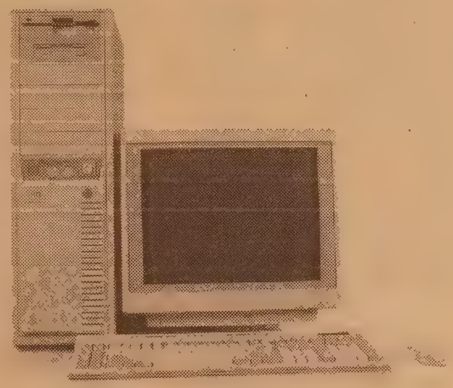
Top Performance EISA/VESA System



- Intel DX-486 Processor
- ZIF Socket OverDrive Ready
- 8KB Internal Cache
- 256KB External Cache
- 8MB RAM (Max. 128MB)
- 1.2MB FDD
- 1.44MB FDD
- 32-bit EISA SCSI II Controller
- 2 16550 UART High Speed Serial Port
- 1 Parallel Port
- 540MB SCSI HDD
- Tseng Lab ET-4000 W32 VL-B GraphicAccelerator Card/1MB
- Mid Tower Case w/ 230W Power Supply
- 14" ViewSonic 6E Non-interlaced Monitor
- 101-key Keytronic Keyboard
- 3 Button Serial Mouse
- Microsoft DOS 6.22
- Microsoft Windows 3.11
- Free Mouse Pad

DX-33	**$1845**
DX-50	**$1995**
DX2-66	**$1945**

HD 486 System Below $1000

- Intel SX 486 Processor
- 128K Cache
- 4MB RAM (Max. 32MB)
- 1.44MB FDD
- 340MB IDE HDD
- 2H/2F IDE Disk Controller
- 2S, 1P, 1G Ports
- 16-bit SVGA Card/1MB
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- 14" SVGA Monitor, .39 dpi
- 101-key Enhanced Keyboard
- 3 Button Serial Mouse
- Microsoft DOS 6.22
- Microsoft Windows 3.11
- Free Mouse Pad

486SX-33	**$959**

HD Computer continues to offer leading, high-performance system configurations for any application. Custom configuration. Lifetime technical support. 30-day money back guarantee. No other Bay Area system integration house can boast this type of service and support.

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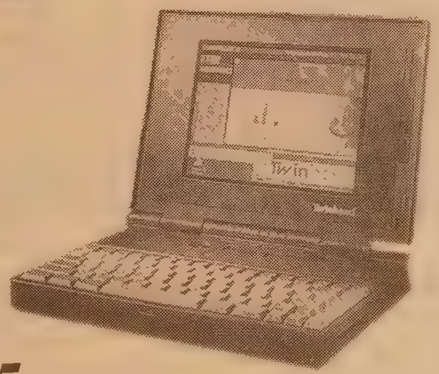
NOTEBOOK

Twinhead Powerful Slimnote

- Intel SL Enhanced Processor
- 4MB RAM Expandable to 20MB
- 1.44MB Built-in Floppy Disk Drive
- 84 Keys Keyboard
- PCMCIA Type II Slot
- Built-in Trackball
- 10" VGA/Mono Display
- MS DOS 6.2, MS Windows 3.1
- Physical Dimensions 8.5" x 11" x 1.6"
- Weight with Battery 5.8 lbs

486DX-33 w/200MB HD	**$1995**
486DX2-66 w/200MB HD	**$2150**

Twinhead 4 Pounds Powerful Subnote



- Intel SL Enhanced Processor
- 4MB RAM Expandable to 8MB
- 1.44MB External Floppy Disk Drive
- 8" Side lit VGA display, 64 shades
- 85MB IDE Hard Disk
- 79 Keys Keyboard
- 64 Gray Shades VGA Display
- PCMCIA Type II Slot
- Built-in Trackball
- MS DOS 6.2, MS Windows 3.1
- Physical Dimensions 7.1" x 10" x 1.6"
- Weight with Battery 4 lbs

486SL-33 Only	**$1105**

Twinhead Brilliant Color Notebook

- Intel SL Enhanced Processor
- 4MB RAM Expandable to 20MB
- 1.44MB Built-in Floppy Disk Drive
- 84 Keys Keyboard
- 256 Color Display/512K RAM
- PCMCIA Type II Slot
- Built-in Trackball
- MS DOS 6.2, MS Windows 3.1
- Physical Dimensions 8.5" x 11" x 1.8"
- Weight with Battery 6.3 lbs

486DX-33 w/200MB HD Dual Scan Color	**$2395**
486DX-33 w/200MB HD Active Color	**$2950**
486DX2-66 w/200MB HD Active Color	**$3570**

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AMI (W/CPU)	
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60 MHz PCI/VLB Excalibur 256K	$1095
60 MHz PCI/ISA Excalibur 256K	$1095
486 EISA/VESA Enterprise III 256K 33/66MHz	$860/945
486 EISA/VESA Enterprise IV 256K 33/66MHz	$740/835
486 VLB/ISA Super Voyager 256K 33/66MHz	$575/695
Micronics (W/O CPU)	
90 MHz PCI /ISA Neptune 256K	$645
66/60 MHz EISA/PCI M5PE 256K	$615
60 MHz PCI/ISA 3PCI Slots 256K	$485
486 EISA E2 256K	$395
486 EISA/VLB 256K	$495
486 JX30 VLB/ISA 256K	$285
486 VLB/ISA 256K	$235
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90 MHz EISA/PCI Dual Processor	$895
60 MHz EISA/PCI 256K	$395
60 MHz PCI/ISA Mercury 256K	$325
486 PCI/ISA Saturn 256K	$295
486 VLB/ISA SIS Green 128K	$145
486 VLB/ISA Support DX4 256K	$175
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90 MHz PCI/ EISA Mercury 256K	$585
90 MHz PCI/VLB/ISA Opti 256K	$415
66/60 MHz PCI/VLB/ISA Opti 256K	$365
66/60 MHz VLB/ISA Opti 256K	$395
486 VLB/ISA Contaq 128K	$125
486 EISA/VESA SIS 256K	$295

Controllers

Adaptec	
1522A ISA/SCSI Fast w/Kit	$139
1542CF ISA/SCSI Bus Master w/Kit	$239
1542CF+ ISA/SCSI w/Corel Kit	$312
2742T EISA/SCSI 14HDS w/Kit	$359
2842VL VLB/SCSI Fast w/Kit	$259
2940 PCI/SCSI w/Kit	$275
2940W PCI/SCSI Wide SCSI w/Kit	$315
PCMCIA SLIM SCSI	$289
AMI	
EISA/SCSI Caching Controller	$389
VESA/SCSI Caching Controller	$393
Buslogic	
BT 542B ISA/SCSI Bus Master w/Kit	$209
BT 545S ISA/SCSI Fast w/Kit	$218
BT 445S VLB/SCSI w/Kit	$274
BT 742KT EISA/SCSI w/Kit	$315
BT 747AK EISA/SCSI Fast	$364
KT 946C PCI/SCSI Support 8GB	$295
DTC	
DTC 2278 VLB/IDE	$39
DTC 3280 ISA/SCSI	$139
DTC 3270 VLB/SCSI	$119
DTC 3290 EISA/SCSI Caching Controller	$499

Controllers

Future Domain	
TMC 850 ISA/SCSI 8Bit	$59
TMC 1670 ISA/SCSI 16Bit	$149
TMC 1680 ISA/SCSI 7HD/4FD	$139
Q Logic	
Fast ISA/SCSI Kit	$124
Fast VLB/SCSI Kit	$189
Fast EISA/SCSI Kit	$199
Fast PCI/SCSI Kit	$289
NCR	
NCR PCI/SCSI 810 SCSI II	$125
NCR PCI/SCSI 825 SCSI II & Wide SCSI	$195
Trantor	
8Bit ISA/SCSI	$49
EPP Mini SCSI	$209
Others	
PCI/IDE IDE Enhanced	$42
DPT EISA/SCSI Fast w/Kit	$419
VLB/IDE w I/O	$45
ISA/IDE 16Bit w I/O	$25
Super IDE 16Bit w/16550	$59
High Speed Serial Port	$42
AT/IO 2 Serial 1 Parallel	$19

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ATI	
Graphics Ultra Pro Turbo 64 PCI/4MB	$589
Graphics Ultra Pro Turbo 64 PCI/VLB/2MB	$379
Graphics Ultra Pro PCI/2MB	$299
Graphics Ultra Pro VLB/2MB	$299
Graphics Ultra Pro EISA/2MB	$329
Graphics Ultra Pro ISA/2MB	$279
Graphics Ultra Plus 2MB	$215
Diamond	
Stealth 64 PCI/VLB/4MB VRAM	$469
Stealth 64 PCI/VLB/2MB VRAM	$339
Stealth 64 PCI/VLB/2MB DRAM	$219
Stealth 64 PCI/VLB/1MB DRAM	$179
Viper SE PCI/4MB	$509
Viper SE VLB/2MB	$359
Speed Star 64 2MB	$199
Speed Star 64 1MB	$149
Stealth 32 PCI/VLB/2MB	$189
Speed Star Pro PCI/VLB/1MB	$118
Orchid	
Celsius VLB 2MB/1MB	$239/179
Fahrenheit 1280 Plus ISA/1MB	$139
Fahrenheit 1280 Plus VLB 2MB/1MB	$189/139
Kelvin 64 VLB/PCI/2MB	$229
Kelvin 64 VLB/PCI/1MB	$159

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Matrox	
MGA-ULT/2+ VLB/2MB	$429
MGA-IMP/31A VLB/ISA/3MB	$739
MGA-PCI/2 PCI/2MB	$399
MGA-PCI/2+ PCI/Upgradeable to 4MB	$429
MAT IMP Plus PCI 2MB	$415
2MB Memory for MGA-PCI/2+	$275
Number Nine	
9GXe L-10 ISA/1MB	$255
9GXe L-11 VLB/ ISA/2MB	$349
9GXe L-12 VLB/ ISA/3MB	$413
9GXe L-14 ISA/4MB	$349
9GXe 64 PCI/VLB/1MB	$179
9GXe 64 PCI/VLB/2MB	$249
9GXe 64 Pro PCI/VLB/2MB	$349
9GXe 64 Pro PCI/VLB/4MB	$499
Hercules	
HG 720 VLB/2MB	$319
HG 310 ISA/1MB	$209
HG 610 VLB/1MB	$249
S 501 VLB/1MB	$139
S 801 PCI/1MB	$129
D 601 VLB/1MB	$159
D 602 VLB/2MB	$219
D 702 VLB/2MB	$229
D 902 PCI/2MB	$239
Cardex	
ET-4000 ISA/1MB/True Color	$95
ET-4000 W32 VLB/1MB/2MB	$125/185
CIRRUS LOGIC 5428VLB/1MB	$95
UMC/IDE VLB/1MB Built-In IDE/ID	$115
WD ISA WD Chipset /ISA	$95
Others	
M.G.P. Card	$25
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Intel Satisfaxtion 400 INT	$269
Intel PCMCIA 14.4K INT	$415
U.S. Robotics	
14.4K Fax Modem INT/EXT	$109/129
28.8K Modem 14.4K Fax INT/EXT	$199/209
Hayes	
Accura 14.4K INT/EXT	$129/149
Accura 28.8K Fax 14.4K EXT	$249
Optima 14.4K EXT	$395
Optima 28.8K Fax 14.4K EXT	$445
PCMCIA Optima 14.4K	$295
Zoltrix	
2400 Modem INT	$40
9600/2400 Fax Modem INT	$59
14.4K Fax Modem INT/EXT	$89/119

Hard Disk

Maxtor

Conner ***IDE***

Seagate ***Enhance IDE***

Western Digital ***SCSI II***

Quantum ***Fast Wide SCSI***

Fujitsu

Micropolis ***170MB - 9GB***

IBM

HP

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Colorado	
DJ-10 120MB/INT	$99
DJ-20 250MB/INT	$159
Tracker 120MB EXT	$279
Tracker 250MB EXT	$317
FC-20 Controller	$79
Power Tape PT-25 2GB/INT	$965
Power Tape PT-50 4GB/INT	$1525
Conner	
250MB Tape Drive INT/EXT	$149/299
2150S Viper 250MB INT/EXT	$329/449
2525S Viper 525MB INT/EXT	$459/569
2750 1.3GB INT/EXT	$799/899
2800 2.0GB INT/EXT	$999/1099
Summit	
SE-120 120MB/INT	$129
SE-250 250MB/INT	$159
Wangdat	
3100DAT 2.0GB INT/EXT	$849/949
3200DAT 4-8GB INT/EXT	$899/999
HP	
2.0GB 35470DAT INT/EXT	$799/899
4-8GB 35480DAT INT/EXT	$889/999
4-16GB C1533A INT/EXT	$1099/1195
EXABYTE	
2.0GB EXB-4200C INT/EXT	$949/1035
5.0GB EXB-8505 INT/EXT	$1825/2350
1.5GB EXB-2501 2NT/EXT	$529/685

Monitors

NEC	
NEC 2V	$359
1431 14'NI 1024x768	$319
3V 15"NI 1024x768 .28	$489
3FGe 15"NI 1024x768 .28	$549
4FGe 15"NI 1024x768 .28 Flat	$629
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Sony Magic Link Arrives:

First Available PDA With General Magic Technology

Although the Motorola Envoy was announced long before the Sony Magic Link, the Magic Link has appeared first. Already it's generating a stir in the marketplace, and even some longtime Newton users have switched allegiances after using the new device.

The new Magic Cap-based PDA from Sony, called the PIC-1000 Magic Link, utilizes the Magic Cap and Telescript technology developed by General Magic, discussed in previous months in this space. Although General Magic has raised some eyebrows for creating a rather cutesy "hyper-non-technical" interface, early reports suggest that despite the lack of attention given to the traditional "power user," the interface is remarkably efficient, with many features to help speed data entry and retrieval.

Magic Cap

Magic Cap is an operating system based on a spatial metaphor of everyday objects and settings: you start out sitting at your "desk," with various icons representing functions that you might want to use (a datebook, an IN and an OUT box, etc.). Many of the functions of Magic Cap-based machines are accessible directly from your "desk." The interface is expandable; you can go outside your office and walk down a virtual hallway with more functions, and even leave your "building" and walk down the virtual "street" to access third-party services such as America Online and AT&T PersonaLink email. (I've commented before on what I consider the rather ugly aesthetics of this interface, but of course for some it might be appealing; also, it's apparently possible to customize the interface to a large extent if you wish.)

Some have worried that it might be cumbersome or slow to access information; however, it turns out that a number of accelerators have been built in to alleviate this, and the design allows for shortcuts if necessary. The on-screen keyboard allows data entry by "typing" (no handwriting recognition). The virtual keyboard is much larger than the Newton's little tap-entry keyboard—large enough, in fact, that it's possible to type with your fingers directly on the touch-sensitive screen.

Magic Cap is designed to be implemented by any number of different hardware manufacturers. Using a business model similar to that of 3DO, General Magic does not manufacture machines itself, but rather licenses the technology to third parties. Sony and Motorola have both committed to building Magic Cap-based machines, for example, and others are working on their own devices.

Every Magic Cap device comes with built-in communication capability. The Motorola Envoy is a wireless communicator and has wireless data transmission capabilities built in. The Sony, by contrast, has a more traditional 2400bps faxmodem built in which requires connecting the unit to a regular phone line for operation. This design, while less portable than the Envoy, has the advantage of being cheaper and lighter in weight.

> Early reports suggest that despite the lack of attention given to the traditional "power user," **General Magic's** interface is remarkably efficient.

Magic Link

The Sony unit weighs in at 1.2lbs. and measures 7.5" x 5.2" x 1"; a fairly large size, a bit too big for a pocket, and even larger than a Newton. Though it is selling for less than the Envoy's probable price, it is still a bit expensive at $899. Despite this, however, according to informal reports Magic Links are selling at a brisk pace, and it is difficult to get hold of any of the first run of machines.

The base unit comes with 1MB of RAM, a single PCMCIA Type II slot, and a serial port. The Link takes six standard AAA batteries, but an optional Sony NP500H lithium ion battery can also be used ($79.95) which gives ten to twelve hours of continuous use. This allows several days of average use per charge.

The unit comes with a wide variety of built-in features, including all of the Magic Cap standard services (datebook, calculator, address book). The unit also has AT&T PersonaLink electronic mail support, limited America Online access (email, news, and stock quotes), Pocket Quicken, a speller, a phone dialer (an optional $60 phone headset turns the unit into an actual phone), a couple of games, and the PenCell spreadsheet (a feature I'm particularly happy to see).

One amusing feature is that the device can be used as a Sony remote control (the unit has a built-in infrared port for data transfer).

AT&T PersonaLink email is available for an introductory price of $9.95/month with unlimited email and an 800 access number. I'm not sure how long that kind of pricing will last, but it's a great deal for the profes-

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sional on the road; no matter where you are in the country, the service is as close as the nearest phone (well, the nearest phone with a modular phone jack). Gateways are available to a wide variety of different email systems; it's fully linked to the Internet, MCI Mail, CompuServe, America Online, and you can even send messages to SkyTel pagers. Like all Magic Cap mail, PersonaLink supports graphics, animations, sounds, and even MIDI musical "stamps" as embellishments to your messages.

The Sony 1MB static RAM expansion cards are $200; a bit high for RAM, however I have heard unconfirmed rumors that Apple 1MB SRAM cards will work, and they're only around $50 each. Adding a megabyte of RAM will triple your available storage capacity, since only half of the meg that comes standard with the Magic Link is available for data storage. According to some early users' reports it's quite easy to use up that 512K, so adding an expansion card is a good idea (however, keep in mind that adding this card takes up the one and only PCMCIA slot in the machine). The unit is designed to be graceful about handling low-memory conditions, however, prompting you to discard items when it gets low on memory.

AT&T PersonaLink email is available for an introductory price of **$9.95/month** with unlimited email and an 800 access number.

Data entry is designed to be quick and is aided by context-sensitive cues. For example, in the address book, the software will try to guess which city you mean when you enter an address; after you type the first few letters of a city you've entered before, the unit will fill in the rest of the name, as well as the first three digits of the ZIP code (you can either ignore the suggested city, or select it by hitting the "Next" button). "Stamps" can be added to any address book entry, which can be later used to group entries together (for example, all entries with a particular stamp can be accessed later as a group). Data is structured in a free-form manner; the address book allows any number of additional pieces of information to be "stamped" onto a particular entry.

I am particularly happy that this machine comes with the PenCell spreadsheet built in. As an avid user of the spreadsheet capabilities of my Casio SF-R20, I find the spreadsheet gives any portable computer a much greater breadth of application than it would have if restricted to just a simple set of built-in functions. With a spreadsheet you can do everything from financial projections to figuring schedules to planning the itiner-

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ary for a road trip. I find spreadsheets much easier to use and more flexible and powerful than regular calculators; whenever I need to do some quick figuring, I can whip out my pocket spreadsheet and be able to keep track of a complicated calculation much more easily than with a regular calculator, because intermediate results can be left in cells in the spreadsheet for later reference (unlike a calculator which has only one value visible at a time).

An optional pager card can be purchased which plugs into the PCMCIA slot and turns the machine into, well, a pager. The only problem I see here is that many, if not most, users will probably want to use their PCMCIA slot for an SRAM expansion card (note: flash RAM is not supported, you can only use an SRAM card—I suspect for power level considerations).

Other optional accessories include an $80 leather carrying case and an external keyboard for $130. The single PCMCIA slot is not quite as bad as it might seem: after all, the Newton only has one PCMCIA slot, and this machine already has a built-in modem (a common use for PCMCIA slots in other handheld machines).

What We'd Like To See

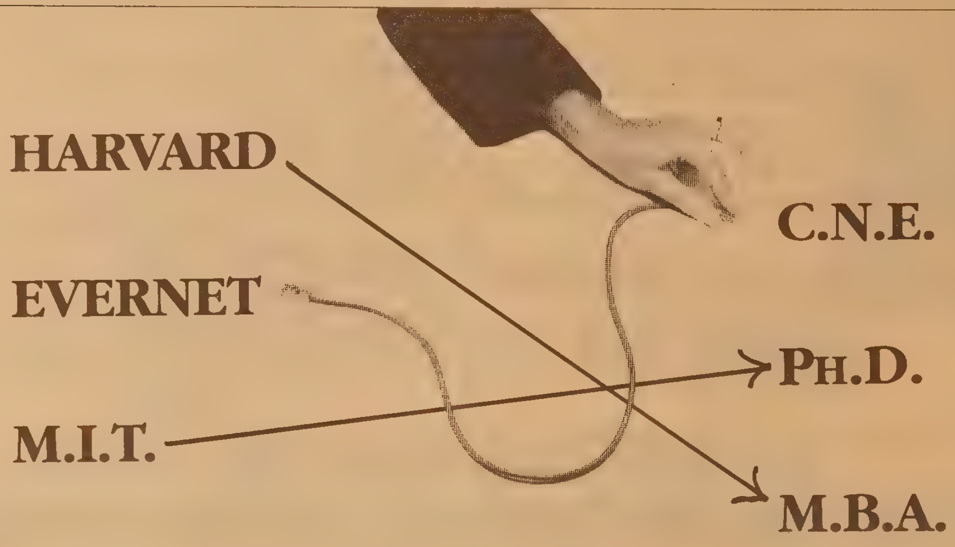
One feature unfortunately missing from the unit is a regular telecommunications program. Although the unit has a lot of built-in support for sophisticated communications using the Telescript protocol, there's no way to dial up a regular terminal-style service. Perhaps a third party will create a small application to address this problem.

Another missing facility at the moment is that, although email support is available, the PC and Mac data transfer products are not yet available as of this writing. However, General Magic claims that the personal computer link will be available very soon, perhaps by the time you read this.

General Magic has been questioned about its developer programs. Developer support for the Magic Cap operating system has been very selective; only the big players have had any support to speak of, leaving smaller players out in the cold. The stated policy of General Magic is that they wanted to give a small number of developers very good support, rather than giving a large number mediocre support. This may or may not turn out to be a good idea; it's obvious that the Magic Link comes bundled with a lot of good and useful software, but it's not clear how much the lack of strong and wide developer support will affect software and shareware availability in the future. For the moment the strategy seems to be working, but it is an area of some concern.

Overall, the Sony Magic Link is an impressive new entrant. Though potentially hampered by a high initial price, the unit is also extremely powerful and comes with a large number of useful built-in applications that put this machine a cut above the rest. Even if you never used the communications

continued on page 178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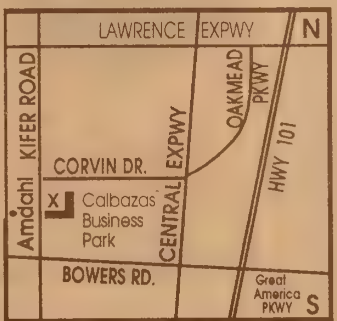

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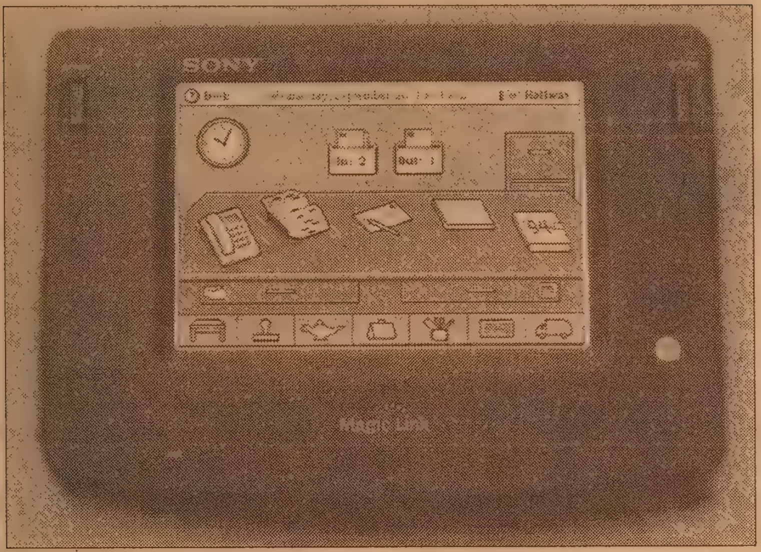

capabilities of Magic Cap and Telescript, the Magic Link has enough features to have formidable potential as just a standalone handheld organizer. More on this unit and General Magic in future columns.

Magic Cap On Your Desktop

An interesting announced plan of General Magic is that a PC and a Mac version of the applications and operating system will be made available sometime next year. This will allow PC owners to use Magic Cap datebook, email, and other applications that can directly interoperate with portable Magic Cap users. The Magic Cap software could make for a very nicely designed desktop personal information manager, and having Magic Cap on your desktop could also make it easier to transfer information back and forth to a Magic Cap-based PDA.

Let's hope that this product, if and when it arrives on the market, will be priced low enough to make it affordable to existing users of the portable product.

Can You Write Graffiti?

You may remember that in a previous column I mentioned that one of the ways in which pen-based handheld users can improve their machines' ability to recognize their handwriting is by modifying their handwriting to fit the machine. Unfortunately, no matter how much you try, there are some symbols that many handwriting recognizers simply aren't able to reliably distinguish (for example, a "5" vs. a capital letter "S").

Palm Computing has taken this idea to its logical conclusion and come up with a new idea which could well do wonders for handwriting recognition as a data entry technology: it's designed a new alphabet which is specifically intended to make handwriting recognition easier. Called Graffiti, the software runs as an add-on to the Newton, Magic Cap, GEOS, Windows for Pens, Microsoft's Winpad, and PenRight! operating systems. It defines a new set of strokes which are designed to be unambiguous and allow for quick and highly accurate handwriting recognition.

According to Palm Computing, the average user can learn to achieve speeds of up to 30 words per minute with 100% accuracy. Seems like an interesting idea worth checking out. Versions for the Newton are not quite ready yet, but the GEOS (Tandy Zoomer) version is available now. ■

RESOURCES:

Sony PIC-1000 Magic Link
Sony Corporation
1-800-342-5721

Graffiti
Palm Computing
1-800-881-PALM

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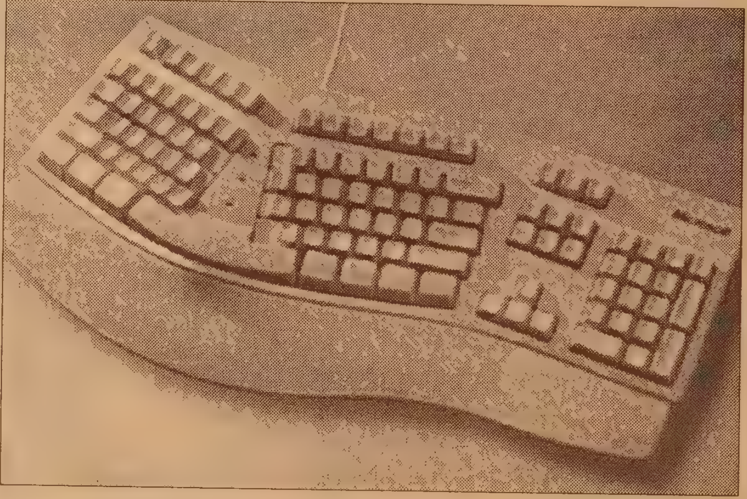
I am always on the lookout for good full-size keyboards to use with portables and was surprised not long ago to learn that Microsoft was introducing the Microsoft Natural Keyboard designed specifically for Windows users. Since more and more of us are using Windows, it seemed like a keyboard to examine.

Microsoft says it did lots of research in order to find out what keyboard design would best suit people who spend many hours working at their computer. After much research, Microsoft settled on this design. Overall, I am pleased with it.

When you look at the keyboard, you will immediately see that it looks different. The most striking design feature is that the keyboard layout has been redesigned to allow the wrists to remain straight while you are typing. This is accomplished by tilting the keys that you normally strike with your left hand out to the left and skewing those keys that are used by the right hand out to the right. The result is a layout that divides the keyboard into a pattern that includes an inverted V, coming together near the six and seven keys and being furthest apart between the B and N keys.

At first, the keyboard felt weird to me. But after a couple of days, my typing speed was back to normal and my accuracy was perhaps no worse than before. At this point, I don't really know how a standard keyboard would feel to me. Microsoft has also built in a palm rest and a height adjustment on the front edge of the keyboard so you can set it up so the keyboard runs downhill. If you place your keyboard in a tray under your desk, this setting may work for you.

This is the first keyboard I have seen that has software, which is the part I like best. The software gives you the ability to switch quickly between applications and lets you control other features on the display. Microsoft has added three keys to the standard keyboard. Two of these are special Windows keys that trigger a newly designed Task Manager pop-up screen. The Task Manager lets you choose—via the mouse—any of the applications already open. Additionally, there are nine icons along the bottom of the Task Manager window that you can program to open your favorite applications. In order for me to switch between any of my frequently used applications, all I do is hit the Windows key and then press the appropriate function key, or use the mouse. I like this feature a lot.



RESOURCES:

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If you go into the IntelliType Manager, you can control many features of the keyboard itself, including its basic layout. You can, for instance, convert the keyboard into a Dvorak layout. There are also other aspects of the keyboard that you can control from this window, such as setting it up so that NumLock is automatically turned on or to disable the CapsLock key so you cannot accidentally hit it.

If you press the control key, when you release it a series of concentric circles will appear around the mouse pointer to help you locate it. I think Microsoft missed the boat here. They should have designed it to find the cursor. It is easy to find the mouse pointer by simply moving the mouse. If you routinely have trouble finding your cursor, you can change its blink rate. However, this software also lets you adjust many aspects of the mouse operation. The most interesting of these features is the ability to have the pointer reappear at the bottom of the screen if you move past the top of the screen. Likewise, you can move to the left by going off the right edge of the screen. This feature takes some time to get used to, but I think that in the end it will turn out to be useful.

While the keyboard has many features to commend it, the Microsoft Natural Keyboard does have its flaws. First, I still prefer a different placement of the function keys, which Microsoft has positioned across the top of the keyboard. I cannot figure out why so few manufacturers give you the option of having these keys at the left of the keyboard where you can easily chord the keys in conjunction with shift, control, and alt keys. My second layout problem is that Microsoft gives you no option about where the control and CapsLock keys are located. I still prefer the control key to be where the CapsLock key is typically located—to the left of the A key.

A final complaint is that I don't really like the feel of this keyboard, manufactured for Microsoft by KeyTronics. It just doesn't have the crispness I like. In the end, however, preference in this area is pretty much a matter of personal taste and I can't really fault Microsoft for not making a keyboard that corresponds to my taste.

Will I continue to use this keyboard despite my reservations? I suppose I will. While I can get used to the layout differences, I don't want to do without the convenience that the software and the Windows key afford. My hope is that other keyboard manufacturers will pick up the basic concept of this keyboard and begin to make a variety of designs that will meet the personal preferences of a wide range of users.

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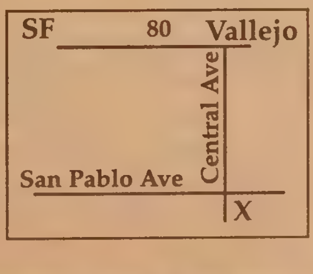


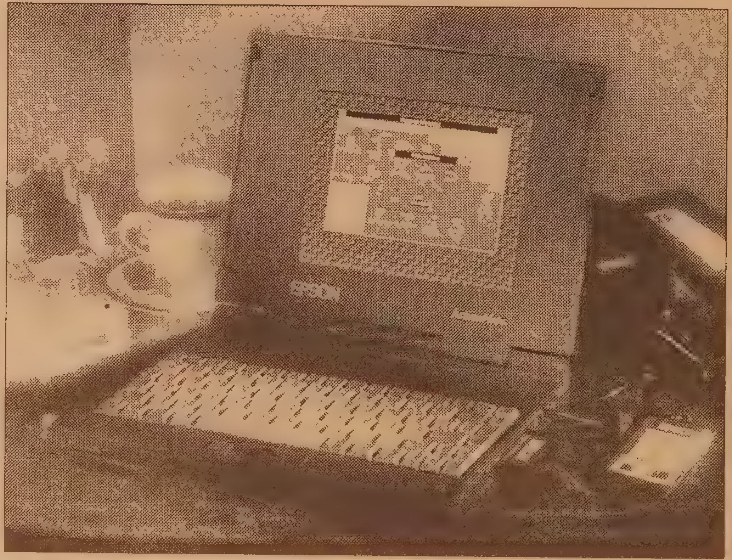
Computer Of The Month

Epson's ActionNote 700C

Epson is an old and trusted name in the computer business. A division of Seiko, it quickly established itself as a major supplier of printers. In time, however, it lost the lead to Hewlett-Packard, who still dominates the printer market. Epson has been able to maintain a presence in the portable market since nearly the beginning. Recently, it introduced a long-awaited line of portables that includes models ranging from an entry-level monochrome screen with a 120MB hard drive ($2149) all the way up to their top-of-the-line active matrix color model with a 260MB hard drive ($3699). This month, I examine the mid-range model with a dual scan passive matrix color display and a 210MB hard drive ($2799).

I waited a long time for this machine. The original press release arrived nearly a year ago, but shipment did not actually begin until June of this year. While I can find no particular fault with this machine, it points out just how rapidly the portable market is growing and changing. In its design phase, this series probably seemed like a powerful entry, but by the time it actually shipped, a 486DX processor running at 33MHz is nothing to get excited about. Make no mistake about it, this is nothing to be ashamed of, but on the other hand, there are faster machines on the market. This machine, however, does have much to commend it.

It weighs in a little lighter than many comparable units at 4.9lbs. The 8.5" x 11" footprint is pretty standard. Its 1.6" thickness partly accounts for its light weight. ActionNote 700C comes standard with 4MB of RAM, expandable to either 8MB (additional $399) or 20MB (additional $1399). The hard drive is removable and can be upgraded. More and more, I am coming to believe that the 1.8" hard drives will dominate in the future because they can be standardized and therefore can fit into almost any computer. Currently, the hard drive for this notebook is only available from Epson, which limits your options.



Epson has been able to maintain a presence in the portable market since nearly the beginning.

Epson builds a nice keyboard into the unit. It has a good feel and layout. If you decide to buy a full-size keyboard, it will easily plug into the port on the side of the unit. You can attach either a keyboard or a mouse through this port. There is a built-in trackball, which I like only moderately well. When you are on-the-go, these devices are sure handy, but for serious work back at your primary work site, they are a hindrance. This one, however, is placed in the center of the unit just below the space bar. If you want both an external keyboard and a mouse, you will have to use the serial port for the mouse.

The display is clear and bright, but you still have the option of installing a VGA or super-VGA monitor through the video port on the back of the machine. While I am impressed with the quality of dual scan passive matrix color displays, I do notice that they do not have as wide a viewing range as the active matrix models. If you will have more than one person looking at a display, you might want to consider this limitation before making your purchase.

Epson has included a 9600/2400 baud fax/modem as standard equipment, and also builds in a PCMCIA slot. This configuration gives you many options.

The ActionNote is loaded with power management software and comes with a good nickel metal hydride battery that should go for at least three hours on the color models and up to six on the monochrome unit. Hot swapping allows you to change battery packs without powering down. Extra battery packs are available ($149).

These days, when you buy a notebook computer you are buying a lot more than just the machine itself. Service is such an important component that you must be careful to insure that you will be taken care of if the worst should happen. Epson has gone the extra mile in this regard with its three-year warranty that pays shipping both ways and guarantees to get you a replacement machine by overnight express if you phone them before 3:00. Their idea is that you can remove your hard disk and plug it into the replacement the next day. It is a pretty slick concept and equals any service program I have seen. They have an 800 number, which I checked out and gave up on after being put on hold for more than 15 minutes.

While there are less expensive notebooks on the market through some of the direct sales outfits, street price of this machine may bring it down into the same price range and give you the added benefit of a local dealer for face-to-face support. A final bonus is a wide range of pre-installed software and a nice carrying case that has room for a few accessories including the AC adapter in addition to the computer. ■

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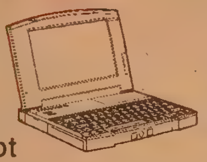

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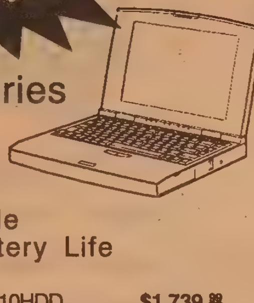

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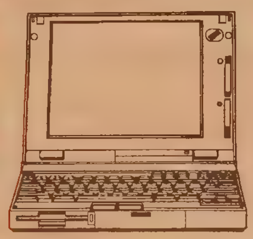

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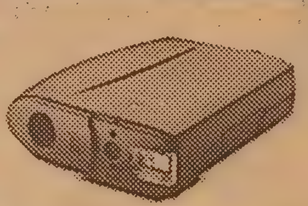

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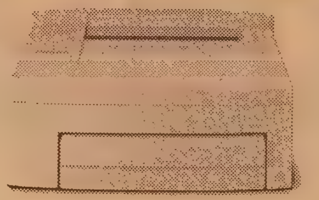

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TELECOMMUTING • BY ROBERT MOSKOWITZ

The State Of Telecommuting

A Look At The Commute In Los Angeles And Elsewhere

Southern California's Commuter Transportation Services, Inc., has just issued its sixth annual "State of the Commute" report, containing some kernels of surprising information along with a lot of expected detail on physical travel to and from work.

For example, nearly a third of commuters surveyed for 1994 say freeway traffic is better than last year, compared with only about 20% who said traffic improved from 1992 to 1993.

But satisfaction with the commute is a two-edged sword, and ride-sharing three or more days per week appears to have been abandoned by some ninety thousand commuters, falling to 1.28 million commuters from 1.37 million in previous years. Among a total of some 6.6 million commuters in the region, only 14% carpool, only 2% ride the bus, and only 1% walk, vanpool, or bicycle to work.

More optimistically, however, the survey shows that 12.5% percent of employees in the region have the opportunity to work at home instead of commuting to their employer's place of business, a major increase from the 10% reported in all of the Commuter Transportation Services' earlier surveys. Of those with this opportunity, 86% actually do telecommute, and together they average four days per month working away from the office.

> **Fourteen percent** of **men** say they can telecommute if they choose, but only **11%** of **women** receive a similar option from their employers.

As you might expect, the opportunity to telecommute is not evenly distributed among employees. For example, 27% of senior managers can telecommute to work, but only 9% of middle managers, and only 3% of secretarial/clerical workers. Fourteen percent of men say they can telecommute if they choose, but only 11% of women receive a similar option from their employers.

The freedom to telecommute also varies by other factors, such as industry and company size. Service providers (19%) and financial companies (17%) lead all other industry classifications, while aerospace offers its employees the fewest telecommuting opportunities (3%). Companies with fewer than twenty-five employees tend to offer 17% of their employees the chance to telecommute, while companies with more than one hundred employees offer this flexibility only to 10% of their workers.

Another, less important factor in having the opportunity to telecommute is an employee's county of residence. For example, 13% of employees living in Orange County can telecommute if they wish, while only 9% of employees living in San Bernardino County reportedly can do so. Los Angeles, Riverside, and Ventura county dwellers all reported in at 12%.

Of those given the chance to telecommute, a minimum of three-quarters always arrange for some days of work away from the office, and the rate of telecommuting acceptance reaches a high of 88% for those given the option who live in Los Angeles and Riverside counties.

A special part of the survey addressed how the region's commuting habits were changed by the January earthquake. One thousand people who work full-time away from their homes were interviewed by telephone about three weeks after the earthquake. To minimize errors introduced by respondents' erratic or unsubstantiated memories, these results were compared with results from earlier surveys.

As predicted in this column, telecommuting was never used as a major remedy to the January earthquake, and commuting habits shaken up by the temblor have largely returned to their pre-quake patterns. That primarily means 6.6 million people travel to work an average of sixty-seven minutes, and an average distance of 33 miles, round-trip, five days a week. The environmental, economic, and emotional costs of that much commuting are—and inevitably must be—staggering, and are probably near maximum because an incredible 81% of these people habitually drive alone in their cars both to and from work—more than in previous years studied.

The survey shows that 57% of the region's commuters (and nearly 80% of those in highly affected areas) made some change in method of getting to work as a result of the earthquake, including moving their resi-

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dence or work location, or changing their means of transportation, their route, their time of travel, or their work arrangements.

However, none of these changes generally tended to reduce the total number of trips or miles traveled to and from work. On the contrary, 30% of commuters reported an increase in their commuting times and distances, making the overall average duration of commute trips increase from about 56 minutes to 69 minutes (and for long-distance commuters, on average from 86 minutes to 109 minutes). In fact, about a third of those commuters whose trips to work got longer (or about 10% of the region's total commuting population) reported a doubling of the time required to get to work each day.

Only 5% of commuters reported switching to ride-sharing. Only 2% switched out of cars to bus and rail transportation.

As many as 4% of the region's commuters tried telecommuting as a result of the earthquake, but a separate 3% had to stop telecommuting for the same reason. The net increase due to the earthquake, therefore, was only 1%. Another 6% of commuters claimed that a shift to flexible hours or compressed work weeks resulted from the impact of the earthquake.

Generally, rather than turn commuters into telecommuters, the earthquake prompted commuters to navigate a better route, endure longer commutes, shorten their work days, or adjust their working hours. In fact, many commuters started driving alone to work in order to accommodate one or more of these three changes.

Survey analysts conclude from all this, without much argument from experts outside the organization, that traffic congestion will have to get much, much worse before the bulk of commuters may be willing to give up their cars for other transportation methods. Even worse, the need to make adjustments to increased congestion may actually make solo driving more desirable than other alternatives. While telecommuting is clearly a viable alternative to physical transit, too few workers presently spend too few days telecommuting to make up for all those who are still

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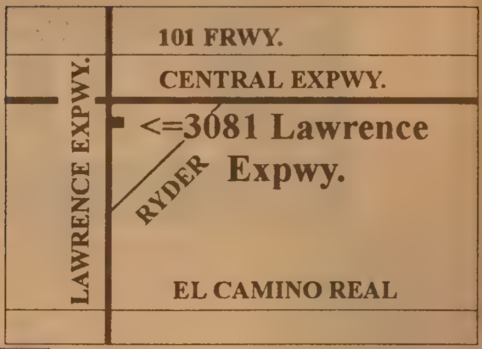

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This year's survey is based on telephone interviews with 2625 residents in Los Angeles, Orange, Riverside, San Bernardino, and Ventura counties.

TRP 2000 Teaches Telecommuting In Denver

A telecommuting outreach program that has trained more than one thousand managers and employees in and around Denver is attracting increased attention from corporate leaders and others concerned with reducing physical travel to and from work. Owing to increased demand, the seminars will now be offered every month.

The TRP 2000 training program began with an emphasis on travel reduction, but in recent years has grown to focus on a broad range of flexible workplace strategies, including office sharing, alternative work schedules, and, of course, telecommuting. The training curriculum occupies four full days, and covers virtually every aspect of telecommuting and telecommuting management, as well as traditional aspects of employee trip reduction.

The program's trainers concentrate on showing business executives how flexible work policies can reduce any organization's expenses while maintaining or increasing productivity, and on giving employees the information, skills, and background they need to perform successfully in today's flexible workplace. Each participant leaves with a customized, realistic flexible workplace plan.

New Software Lets Telecommuters Share Displays

If you're working on a computer and need to collaborate with someone else who's not at your same location, there's new software that promises to make this process a great deal easier.

On the market for some time, so-called "remote-control" software has always promised to let two people view and control one computer. Today, at last, that promise is starting to come true, although the link is still limited to just two computers at a time.

One of the most interesting products with this capability is LapLink for Windows. Long one of the leading packages for file transfer between computers, this first implementation for Windows now incorporates a "remote control" function that operates with equal ease over a cable, a network, or a dial-up telephone wire.

Basically, you run the software and use it to establish a link over the available medium (selected from a list of possibilities you've preestablished). Then, you simply launch applications, load data files, and work to your heart's content.

It's disquieting, at first, to see your computer operating under the control of someone at a distance, or, from the other perspective, to be working your own keyboard and mouse but seeing a different set of files and directories on your familiar monitor.

But the systems work beautifully, and allow you to have a "virtual" presence in someone else's office for the price of a telephone call. Some let you edit the original files on the computer disk, others create new copies of the original files for editing, automatically preserving the original versions.

In addition to LapLink (from Traveling

Continued on page 315

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INTERNET • BY JOHN S. QUARTERMAN AND SMOOT CARL-MITCHELL

How Big Is The Internet Anyway?

A couple of months ago we provided multiple-choice answers to the question "What is the Internet, anyway?" In that article we deferred the question of the sizes of the various networks to another article. This is it.

One reason for developing all those definitions in the other article was so we would know what we were measuring in this article.

The Definitions

The core Internet consists of computers that are reachable with ICMP ECHO (ping) and at least some of the basic TCP/IP application services, such as FTP, the File Transfer Protocol. Here we find nodes such as ns.ripe.net, ftp.tic.com, is.internet.net, ncsa.uiuc.edu, nic.ad.jp, and info.texas.gov. These systems can supply information and other services to the rest of the Internet, and in some cases beyond.

Computers on the core Internet have at least the potential of providing services through a wide array of TCP/IP applications, such as FTP, archie (FTP indexes), TELNET (remote login), Gopher (menu browsing), Veronica (Gopher indexes), and WWW (World Wide Web, a multimedia hypertext system; you may be familiar with Mosaic or Lynx, its most common user interfaces).

The consumer Internet consists of computers that can use interactive services, such as FTP servers that are supplied by the core Internet, but cannot themselves supply such services.

Much of the consumer Internet consists of computers behind firewalls on enterprise IP networks; that is, on networks that use the TCP/IP protocols to support enterprises such as businesses, and that are deliberately walled away so that outsiders can't get to them. Many universities and other types of organizations also firewall, but almost all corporations on the Internet do. Most firewalled organizations keep at least one computer accessible to the rest of the Internet, and can provide services through that computer, but the bulk of the computers on their networks are hidden. Yet those hidden computers can often use WWW, Gopher, FTP, TELNET, etc.

The Internet is already so large it is acting as a sun pulling those gas giants into its orbit.

Outside the Internet there are many networks that do not support interactive communications with the outside world, yet do support asynchronous batch store and forward communications such as electronic mail (and often mailing lists and Usenet news or the like). The biggest collection of computers and networks in the world that can exchange electronic mail we call the Matrix. The Matrix includes the Internet, but it also includes many other systems, such as Prodigy, CompuServe, UUCP, FidoNet, and BITNET. Many of the networks in the Matrix are based on protocols such as UUCP or FidoNet that only support asynchronous batch services, not interactive ones (the UUCP and FidoNet networks are named after the protocols they use).

Other systems support interactive communications, but do not permit their use with other systems. An extreme form of firewalling, for example, is to put a UUCP connection between an IP enterprise network and the Internet. Since no interactive communications can get through UUCP, such an enterprise network is in the Matrix but not in the Internet. And conferencing systems such as CompuServe and Prodigy often have IP connections, but don't let their users use them for anything but mail; thus as far as their users are concerned, they are in the Matrix, but not in the Internet.

And if you can't exchange electronic mail with systems in the Matrix, you're not in the Matrix at all. Many mainframes and isolated BBSes are like this, not to mention LANs that aren't connected to any other network.

These definitions, like any others, are deliberately simplified. Corner cases include things like Novell NetWare LANs with protocol converters that permit their users to use TCP/IP applications such as FTP or WWW without directly using TCP or IP. There's also the ever-popular question of how much of the time does a computer have to be reachable, as in, "What if it's turned off after 5 pm?" However, we can't cover every such possibility here, and we find these definitions as good as any we've seen.

The Categories Summarized

Here's the table from the previous article:

	the core Internet	the consumer Internet	the Matrix
interactive services	supplier-capable	consumer-capable	by mail
	stores and shoppers	shoppers	mail order
asynchronous services	yes	yes	yes

These network categories are concentric. If you can send electronic mail to mids@tic.com and get an answer back, you're in the Matrix, but not necessarily on the Internet. If you can FTP to ns.ripe.net, your machine is at least within the consumer Internet, but not necessarily the core Internet. If someone on the core Internet can connect with FTP to your

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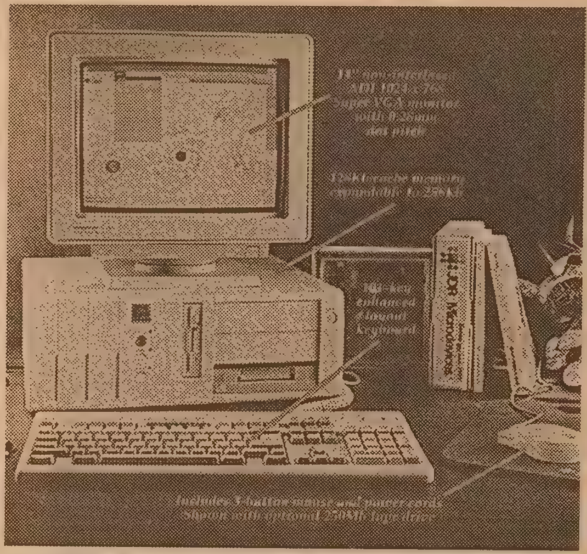
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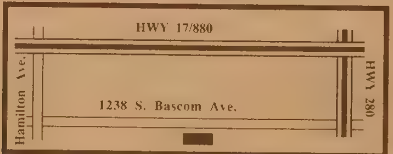
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computer, it is in the core Internet.

We hope it's obvious that there's a big difference between just being able to send mail and being able to use FTP, Gopher, or WWW interactively, just as there's a big difference between buying from a mail-order catalog and browsing in a store. And there's a big difference between being able to supply information interactively to the world and just being able to consume it. But if you don't think these are obvious or big differences, please read the previous article. It's time to move on to the numbers.

To quote one of us (see ftp://ftp.tic.com/matrix/news/v4/faq.406): "The Internet is distributed by nature. This is its strongest feature, since no single entity is in control, and its pieces run themselves, cooperating to form the network of networks that is the Internet. However, because no single entity is in control, nobody knows everything about the Internet. Measuring it is especially hard because some parts choose to limit access to themselves to various degrees. So, instead of measurement, we have various forms of surveying and estimation."

The Network Wizards Internet Domain Survey

The longest running survey is the Internet Domain Survey performed approximately every three months by Mark Lottor, currently of Network Wizards. He uses the Domain Name System (DNS) to count the number of domain names that have an IP address associated with them. He carefully excludes other domain names. For example, those that have only MX records, thus permitting mail forwarding, but not A records for IP addresses, are excluded. (See RFC 1296 and http://www.nw.com).

But note that just because a host has an IP address doesn't mean you can reach it. Lottor tried pinging a sample of the total set of 3,212,000 addresses and found only 22% of them responded. Applying that percentage to the total yields 707,000 pingable hosts.

The smaller figure, for pingable hosts, probably corresponds rather closely with the core Internet. The larger figure includes that plus much of the consumer Internet. Yet the larger figure misses many hosts in firewalled enterprise IP networks, since such networks often don't permit DNS information to be accessed from outside the enterprise. And it counts some hosts that aren't even in the consumer Internet. For example, it counts about 195,000 hosts in the HP Internet, and (unless HP has changed its policies recently), almost none of those hosts can connect out through HP's firewalls to the core Internet.

Nonetheless, we can probably guess that that 3.2 million figure is probably accurate within about a factor of two or so for the consumer Internet, including the core Internet.

The TIC/MIDS Internet Demographic Survey

In December 1993, TIC and MIDS sent out survey questionnaires to almost five thousand organizations on the Internet. We received about 14% usable responses by January 1994.

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Internet *continued...*

741,000 pingable hosts. We didn't try to ping them; we asked the surveyed organizations how many pingable hosts they had, added up the results, and scaled up to the survey population. This number agrees closely with Lottor's estimate of 576,000 pingable hosts for January 1994.

We also asked how many computers in each organization could FTP out to the Internet, from which we extrapolated 1,410,000 total. This question was designed to produce an estimate of the size of the consumer Internet, including the core Internet. Note that the result is quite a bit smaller than Lottor's estimate of 2,217,000 for January 1994.

We also asked how many total computers were in each surveyed organization, which leads to an extrapolation of 4,221,000 such computers. This shows that Lottor's total is not implausible. However, we suspect it counts many computers that are not only not pingable but are also not capable of connecting out to the core Internet.

One thing that is known about the Internet is its growth rate. Or growth rates, rather, since the number of networks in the Internet is growing faster than the number of hosts, which is growing faster than the number of domains. But we know the host growth rate pretty solidly, because it has been measured for quite a while by both Lottor's survey and by a similar survey for Europe performed by RIPE (European IP Networks). So, let's take the 81% growth rate that we usually find in Lottor's results and extrapolate forward from the January numbers from the demographic survey so we can compare the results for July.

Extrapolated for July 1994 from the TIC/MIDS Internet Demographic Survey:

2,040,000	hosts in the consumer Internet and the core Internet
1,070,000	hosts in the core Internet

From the July 1994 Network Wizards Internet Domain Survey:

3,212,000	hosts with IP addresses
707,000	pingable hosts

Since we used comparable growth rates, it's not surprising that these estimates for July compare about the same as the ones for January. But they are useful for our next question.

What About Users?

What most people seem to want to know is not how many computers, but how many users. This is a harder question.

The traditional method of producing an estimate has been to take a host estimate and multiply by a user/host ratio. One problem with this is that nobody knows what the correct ratio is. The ratios most commonly in use are based on some work from 1991 by Craig Partridge. He looked at some sample organizations, such as universities with big timesharing systems that had tens of thousands of users, and research shops with one or perhaps even less users per computer, and came up with a range: between five and ten users per host.

For years we have conservatively split the difference of that range and used a factor of 7.5. Multiplying 7.5 times Lottor's January 1994 total of 2,217,000 hosts indicated about seventeen million Internet users. Using the same factor with Lottor's July figure of 3,212,000 would produce twenty-four million users. Others have chosen the high end and used a factor of ten; this is where the huge estimates you may have seen of twenty-two million users in January and thirty-two million in July came from. But the plain truth is nobody has had much of an idea of what the real factor is.

Until the TIC/MIDS Internet Demographic Survey. In it, we also asked several questions about people, as network users, as total in the organization, etc. From these results we produce an average of about 3.5 users per host. That's off the conservative end of Partridge's range. How could that be?

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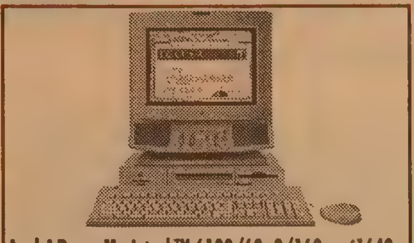

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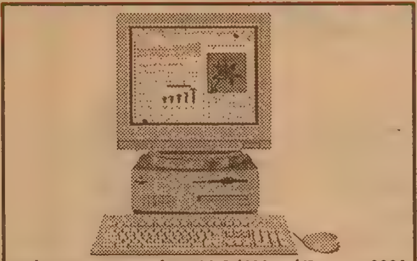

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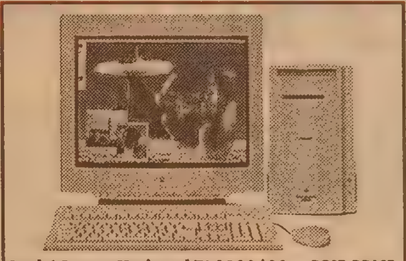

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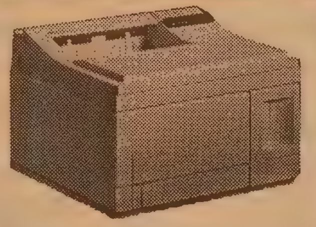

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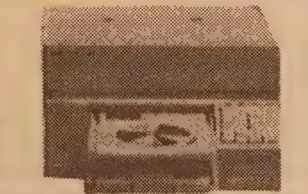

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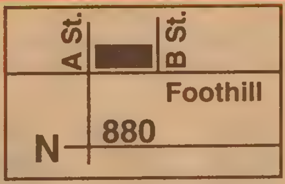

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Well, the increase in single-user workstations, X terminals, PCs as hosts, no-user fileservers, and users of big timesharing systems being spread over many smaller multiuser systems. 1991 was a long time ago in the life of a network that almost doubles in size every year. The factor has quite plausibly gone down since then. And if it has gone down to 3.5, then we have:

Extrapolated for July 1994 from the TIC/MIDS Internet Demographic Survey:

hosts	users	
2,040,000	7 million	in the consumer and core Internet
1,070,000	3.5 million	in the core Internet

What About The Matrix?

Well, let's start with the big commercial mail and conferencing systems, such as Prodigy, CompuServe, PC VAN, NIFTY-Serve, AT&T Mail, GEnie, Sprint-Mail, Easy-Link, MCI Mail, Tymnet, ASCII-net, Asahi-net, People, J&P Hotline, EYE-NET, and JAL-NET. (If you don't recognize all of those names, that may be because many of them are in Japan; PC VAN, for example, is more than a quarter the size of CompuServe.) Adding up the users reported around July for each system on that list, we get about seven million users.

That's an interesting number, because it's the same size as our estimate for the consumer and core Internet. In other words, even by our quite conservative estimate for the size of the Internet, even the core Internet is bigger than any of those other systems, and the consumer and core Internet are at least as big as all of those other systems added together.

And, for that matter, we should add perhaps a million and a half users of AOL and Delphi to the Internet total, since those two commercial conferencing systems now permit their users to use TELNET and FTP and some other interactive services both in and out to the core Internet.

That the consumer Internet is bigger than all these commercial conferencing and mail systems put together is especially interesting considering the way those latter systems count users. Prodigy, for instance, claims one million households of an average of two users each, for two million users. We have to wonder how many of those users are actually active, rather than having merely having once tried using a Prodigy disk they found packaged with their modem. And how many of the active users have ever sent a mail message outside of Prodigy, or sent one at all, for that matter?

It's probably not fair to pick on Prodigy, since it's not clear that the user counts from any of the other similar systems are any more solid. One has to wonder where the surfaces of these gas giants really are.

Meanwhile, our 3.5 users/host estimate for the Internet is for active users. Even by that more stringent measure, the Internet is already so large it is acting as a sun pulling those gas giants into its orbit. CompuServe has announced plans to open up Internet access, and Prodigy is apparently going to follow suit.

Incidentally, expect the Internet user/host ratio to go up rapidly as these big centralized systems join the Internet. Another force pushing that factor up is the rapidly increasing number of small Internet Service Providers (ISPs), such as the World and Zilker Internet Park. The 3.5 users/host ratio may actually be near the lowest we'll see for a long time.

Distributed Networks In The Matrix

Turning away from centralized systems, let's look at the biggest distributed networks in the Matrix. The biggest is the Internet, which we've already examined. The biggest others are BITNET, FidoNet, and UUCP:

hosts	users	network	source
2560	189,000	BITNET	BITEARN host table, courtesy EARN and SURFNET
31,273	2,502,000	FidoNet	FidoNet host table, courtesy Randy Bush
18,117	544,000	UUCP	UUCP map (host table)

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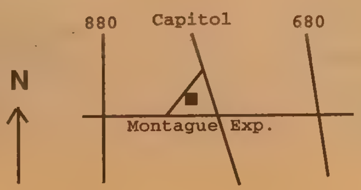

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How are the users calculated from the hosts? By user/host ratios for each network. These ratios are admittedly not very good, but they are what we have for the moment. Some other networks, such as WWIVnet (about the same size as FidoNet), should be accounted for, but we don't have good accountings right now.

And what about Usenet? Well, it's just a service, Usenet news, running on top of UUCP, FidoNet, BITNET, the Internet, and perhaps other networks. Since it's not a separate network, we can't add it in, because all its users are already counted as users of one of the other networks.

So, if we add up all the users inside the Matrix, we get about twenty-one million. That's using our 3.5 users/host factor for the Internet. With our old 7.5 users/host factor, the Internet would show about fifteen million users for July 1994 and the Matrix would total about twenty-nine million. So, a ballpark of somewhere between twenty and thirty million users of the Matrix for July 1994 we think is plausible. Note well that we said for the Matrix, that is, for the biggest collection of computers that exchange electronic mail, not for the Internet.

Outside The Matrix

Outside of the Matrix, the biggest thing we have found that can send electronic mail, yet not to the Matrix, is Teletel (commonly known as Minitel), which is a network mostly in France, with about seven million users. Other things outside the Matrix that can send electronic mail include isolated mainframes, LANs that aren't interconnected with other networks, and isolated BBS systems.

We don't have space in this column for more detail on this subject, but the total of the users of all of these mail-capable systems outside the Matrix is somewhere around thirty million, or about the same size as the Matrix. However, the fastest growing networks, such as the Internet, are inside the Matrix, and it is clear that the Matrix is pulling in more rocks from the cometary halo all the time.

For a visualization of all these worlds of communication inside and outside the Matrix, see *Matrix Maps Quarterly #4*, or for an older version, see ftp://ftp.tic.com/matrix/maps/matrix/cyberspace.gif.

What Next?

There's a lot of room for error in all of these results. The biggest claim we make for the Internet Demographic Survey, in particular, is that no one else has done anything better, and we're doing what we can. If you have suggestions for improvements, do drop us a note.

By the time you read this, we will have sent out a new version of the TIC/MIDS Internet Demographic Survey questionnaire, and may already be comparing the results with Lottor's October Internet Domain Survey. This time we're sending questionnaires to about eighteen thousand organizations throughout the Internet throughout the world, and we've tuned the questions to get more of the information people want to know. ■

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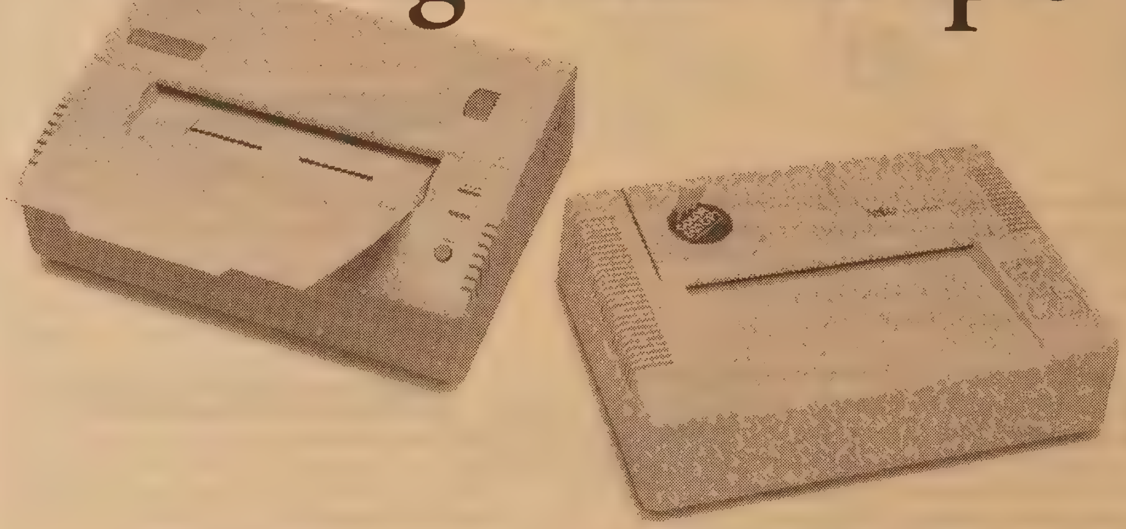

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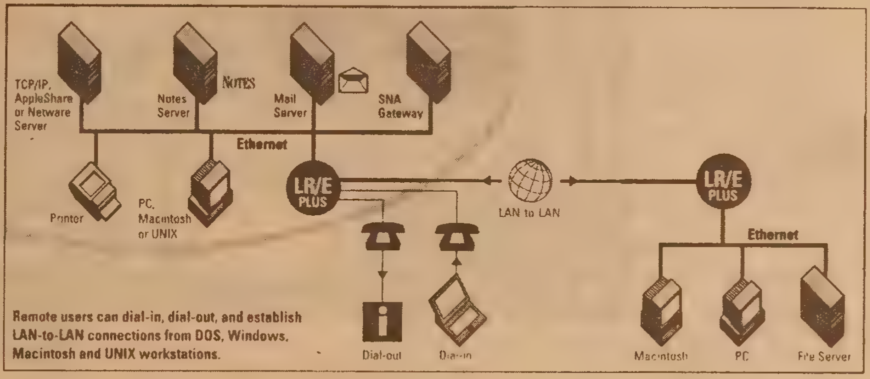

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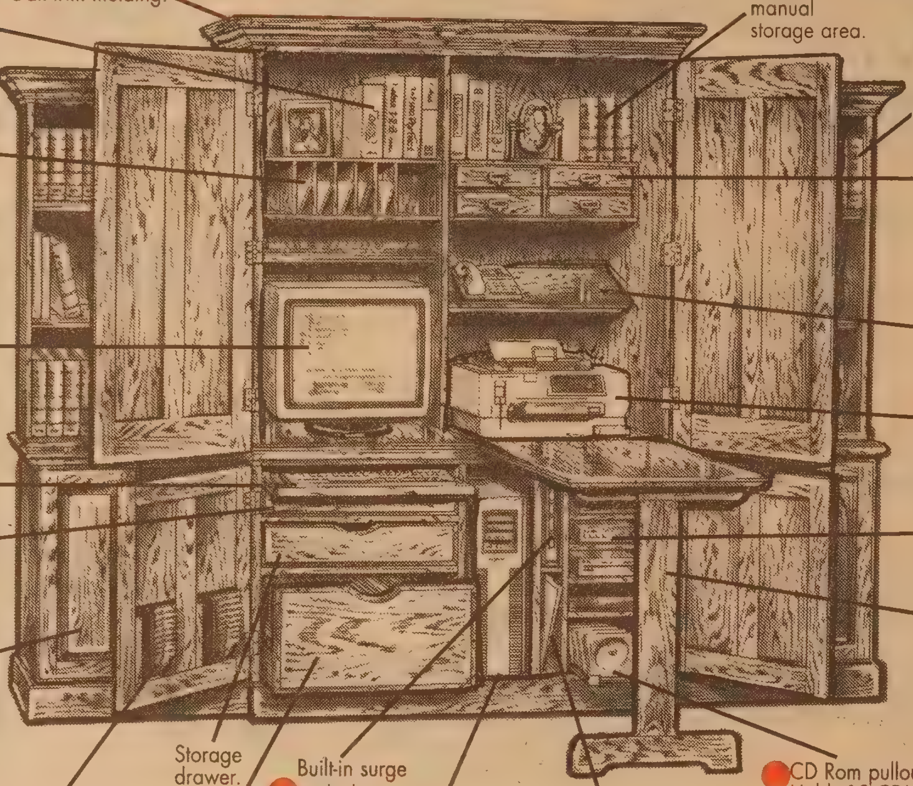

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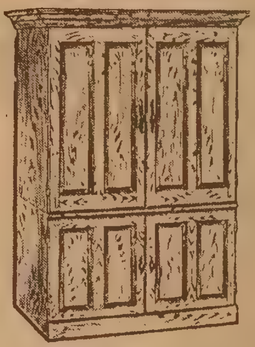

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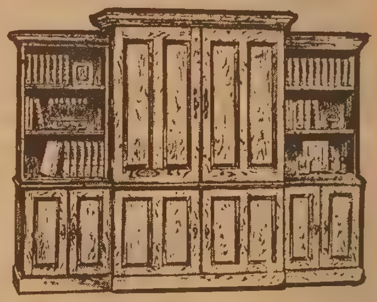

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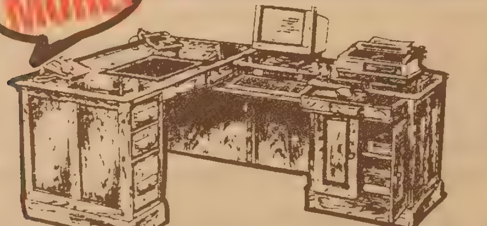

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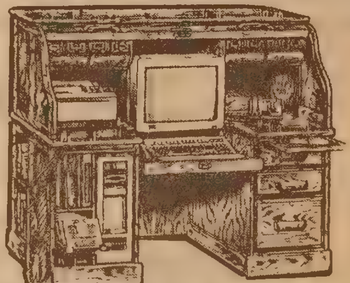

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UNIX • BY BENNETT FALK

Lines To Read Between

"So I sat down and looked, and I saw those curly brackets and I said, 'Wow!'" —Dave Yost, discovering C for the first time in the mid-1970s

The history of UNIX, long an object of interest in this space, is finally the subject of a book, *A Quarter Century of UNIX* by Peter H. Salus (Addison Wesley, 1994, ISBN 0-201-54777-5). Peter Salus is pretty obviously a fan of UNIX, and he's written a book that other fans of UNIX will enjoy immensely.

Non-fans of UNIX may have to work a little harder to make it through some sections, but this book really is suitable for general audiences, and it makes the important point that UNIX is a social as well as a technical phenomenon.

If you count yourself among the cynics (or among the realists), you can take comfort in the fact that you now have some lines to read between. And regardless of your persuasion, you can expect that other history-of-UNIX books will follow.

UNIX With A Human Face

In the best parts of his book, Salus reconstructs the early days of UNIX by letting the people who participated in its creation and distribution speak for themselves in stories, letters, and interviews.

This makes UNIX history as much a human story as a technological one. Salus keeps the focus on the development and circulation of the UNIX system, and provides just enough technical detail to make the anecdotes comprehensible. Some additional information about developments in the technology of microprocessors, terminals, modems, and networks might have helped explain some of the turns UNIX development has taken, but this is beside the point. The basic argument of this book is that UNIX was built by a community of real people who genuinely enjoyed what they were doing.

According to the stories Salus recounts, more than a few features of the core system were built by one or two people pulling an all-nighter to hack some new idea into existence. The implementation of pipes (the facility for connecting the output of one program to the input of another) is one such feat. Ken Thompson is reported to have implemented pipes and adjusted all the existing UNIX utilities to handle piped input in one night. Salus mentions episodes like this so casually that they almost seem like things any motivated, moderately bright person could have done.

Even though Salus never makes a big deal of the genius of the original UNIX developers, their extraordinary achievement becomes apparent from the response UNIX generated outside of Bell Labs. Mike O'Dell, then a student at the University of Oklahoma, read the first published articles about UNIX in a 1974 issue of *Communications of the ACM*, went to a coworker, and exclaimed: "Read this, and then try to tell me that what we've been doing is not just nuts. We've been crazy. This is what we want."

The early UNIX system was not just innovative. It also reflected the values of its creators. As early as 1971, UNIX embodied a certain style. Its developers intended to create software that was straightforward, software that behaved in reasonable ways that a user could understand. In the wake of Thompson's implementation of pipes, this style became a philosophy articulated by Doug McIlroy in an earlier interview with Mike Mahoney:

> **Write programs that do one thing and do it well.**
>
> **Write programs to work together.**
>
> **Write programs to handle text streams, because that is a universal interface.**

UNIX and the philosophy it **embodied** proved to be very attractive to **academic** communities in the **1970s.**

UNIX Outside The Lab

UNIX and the philosophy it embodied proved to be very attractive to academic communities in the 1970s. AT&T made UNIX available under a set of very crude terms: no advertising, no support, no bug fixes, and payment in advance.

While this may have been the official policy that governed the relationship between Bell Labs and its UNIX licensees, Salus makes it clear that the reality was often quite different. Early UNIX sites had no qualms about appealing directly to the system's developers for support. People "called Ken" (Ken Thompson) or "phoned Dennis" (Dennis Ritchie) with questions and cries for help. The developers, in turn, took an interest in their sites. Several anecdotes recount the "unofficial" distribution of a tape from Bell Labs containing some fifty bug fixes between the sixth and seventh editions of UNIX.

Sparked by Ken Thompson's visit to Berkeley in 1975 and the tireless efforts of Bill Joy, U.C. Berkeley became a center of UNIX development, distributing first UNIX enhancements in 1978 and proceeding to complete systems for Digital's VAX computers in 1979.

In 1977, Interactive Systems became the first commercial supplier of UNIX

UNIX continued...

software. Up to this time, UNIX had been chiefly an alternative operating system for various models of the DEC PDP line of computers. When it entered the commercial world, UNIX quickly became a favorite among hardware manufacturers because it promised a stable user environment that would endure through radical changes in hardware.

Most of the book is devoted to the part of UNIX history that can be told anecdotally: noncommercial UNIX development at Bell Labs and U.C. Berkeley, and the spread of UNIX among research institutions through 1984 or so. The fate of UNIX in the world of commerce is given relatively little space.

Salus's account ends in a flurry of short but informative chapters about more recent developments: the UNIX wars of the late 1980s, POSIX and standards, and more recent systems derived from UNIX.

Some of the details of UNIX history are frustratingly out of reach in Salus's account. For example, the trademark status of the name UNIX by AT&T is first mentioned in relation to a discussion of the UNIX user group. In 1977, an AT&T lawyer phoned Mel Ferentz, one of the organizers of the group UNIX USERS, to say that Western Electric would not allow them to use the name UNIX. In response UNIX USERS, which was formed in 1974, changed its name to USENIX and the name of its newsletter from *UNIX NEWS* to *;login:*. The reader is left to speculate about when the name was trademarked and what it was that brought UNIX USERS to the legal department's attention.

In Salus's account, the growth of both the computer industry and the UNIX portion of that industry are barely apparent: the DEC that produced the PDP-11 in 1970 was a lot smaller than the DEC that helped found the Open Systems Foundation in 1987. Salus tracks the number of UNIX sites closely from ten to fifty, but seems to have no taste for tracking the growth of UNIX to millions (or even thousands) of installations.

But completeness is not all it's cracked up to be. There will, no doubt, be future histories of UNIX that are more complete or more scientific than Peter Salus's book, but it's unlikely that any of them will do as good a job of articulating the human element of UNIX.

So don't forget to read the lines before you read between them. ■

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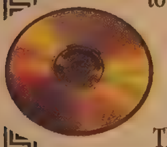

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ACCOUNTING • BY DAVID A. SIMON, CPA AND JENNIFER R. CHERNISS

Inventory Control And Beyond

Bar-Coding Systems For Any Size Business

If counting, sorting, and tracking aren't what you most enjoy about your business operations, a bar-code system may be the answer. In days of yore, scanners and bar codes were principally the domain of supermarket check-out counters and national wholesalers with mega warehouse facilities. Nowadays, a couple hundred bucks and a laser printer will get you a basic system. The simplicity and low cost of admission opens the door for any service organization, small retailer, or professional office to take advantage of a host of nifty applications.

Traditionally, bar-code scanners have been used to track stuff in and out—freight cars, sardine tins, Rolaids. But a bar-coding system is a virtual veg-o-matic of inventory control, slicing and dicing through paperwork in short order. Any task involving storage and identification is a candidate for this contraption.

In addition to traditional inventory functions (we'll get to those later), consider such applications as the following:

- Locating client files.
- Maintaining library records—monitoring who's borrowed books or reference materials.
- Categorizing the contents of floppy disks.
- Tracking workpapers and report production; e.g., a consultant following the progress of a report or a law firm managing documents.
- Fixed asset (property and equipment) accounting, where bar-coding reduces the time otherwise required to enter and verify serial numbers.

The imagination runs wild! As the list of applications grows, many service providers and other businesses who don't traditionally keep inventories are finding creative ways to configure this simple technology. Like the veg-o-matic, you can use a bar-coding system almost anywhere: front office, back office, parking lot, and home.

System Basics

Bar-coding is basically a system of encoding an identification number, optically reading it, and electronically inputting it directly into any number of databases. Its primary application is to keep inventory records up-to-date—informing management of what's in stock, what needs reordering, and how much it costs. Once an object has been labeled for bar-code reading, a swipe of a wand insures that widget gets located, bought, sold, loaned, stolen, consumed, evaluated, moved, redefined, or recoded in the appropriate records and reports.

> Like the veg-o-matic, you can use a bar-coding system almost anywhere: front office, back office, parking lot, and home.

Once in place, system operation yields enormous time savings. But like any form of database manipulation, setup can require a burdensome investment. The place to splurge with a bar-coding system is in the thinking, planning, and design stage.

Ample consideration should be given to what information will need to be encoded. Examples include an item's cost, description, purchase date, and lot number. Every item you want to track requires its own bar-code label; in some cases, more than one label will be desirable, so plan well. It can be inefficient and demoralizing to redesign the format after you've already entered all the data.

Reading Between The Lines

Software for printing bar codes can be surprisingly simple. For entry-level systems, Wynston Technologies, Inc., sells their complete Bar Code Kit, including software and hardware for coding, reading, and database management, all for $299 list. SCAN-ONE, by Vertical Technologies, is designed for use with portable computers ($219).

For software only, one popular low-end package is Bars and Stripes, by Tippecanoe Systems, Inc. ($99), which requires Microsoft Word for Windows or WordPerfect for Windows. The software converts data files created by the word-processor into a variety of label formats, such as file folder labels and address labels.

More powerful software packages allow for greater control over printing and graphics capabilities.

Another feature to look for is database compatibility. For example, Tippecanoe Systems, Inc., also offers software that can read information from dBase and other formats and convert data directly into bar-code labels ($149 or $299, depending on the version). If you have an existing database generated by a popular database program, you should be able to readily print bar-code labels by selecting appropriate software.

For businesses keeping inventory records as part of their regular accounting, the selection of an accounting software package is particularly important. Lower-end accounting software generally has only limited inventory capabilities. Although you may be able to import and export data to run in conjunction with a bar-code system, it can be awkward to do so.

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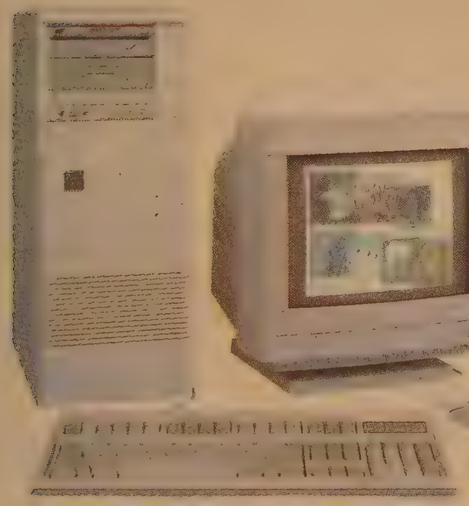

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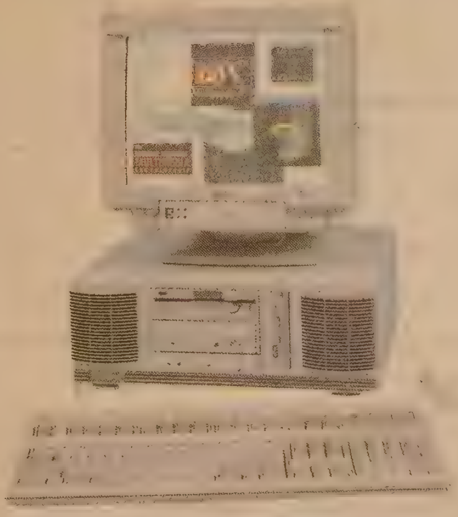

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Most high-end accounting software, on the other hand, fully supports bar-code systems. MAS 90/Evolution/2 from State of the Art, Inc., for example, has complete decoding and label-printing capabilities built into its inventory accounting modules.

RealWorld, another high-end system, does not directly feature these capabilities in its main inventory modules. Instead, RealWorld Corp. sells Synchronics Inventory Plus, which integrates with RealWorld's inventory module to provide bar-code capabilities.

AccPac Plus, by Computer Associates International, Inc., also offers advanced bar-code capabilities, but only in conjunction with third-party add-on software. ScanPAC, by Symbol Technologies, enables AccPac Plus inventory modules to provide a high degree of flexibility in the coding process. A single item can be tagged with multiple bar codes, so items can be identified by part number, Universal Product Code (UPC), and so forth. Because large retailers often require their suppliers to provide convertible bar-coded goods and shipping documents, ScanPAC is designed for retailer approval.

Macola, Inc. offers a high-end accounting package targeted mainly to manufacturers. It features a bar-coding add-on that imports inventory transactions remotely with a portable data storage unit. Even non-manufacturers whose inventory is warehoused at an off-site location may find this feature useful.

Beware of off-brand accounting software tossed in with the scanner to create a package deal. Accounting software isn't a commodity that works great for everyone straight from the box. Handling the data is an accounting function requiring a degree of sophistication not likely to be found in a freebie or thoughtlessly bundled package.

Beam It Up

There are three types of hand-held scanners. The least expensive look like a pen and emit an ordinary beam of light. The disadvantage of these devices is that, due to the quality of light source, they too often don't read the label after a single swipe, and they need to be held directly against the bar code.

The next step up, in both price and ease-of-use, are charged coupled devices (CCDs). CCDs are more sensitive than ordinary light beams. They may therefore be held further away from the label and, for any given distance, are more likely to successfully read on the first pass.

The most pricey type are laser scanners, which have the highest sensitivity and therefore the greatest ease of use.

Inexpensive scanners rely on separate hardware or software decoders to recognize and translate the bar codes. The more sophisticated units, such as those at supermarkets, integrate the scanner and decoder so that the item can be simultaneously recorded and its description displayed at the point of sale.

To connect the scanner to a desktop computer, an expansion card is sometimes required. In other cases, the scanner can be plugged directly into a serial port.

Label Makers

To print bar-code labels, most users can simply use their laser printer with no more additional investment than the purchase of sheets of stickers. In some cases, your old dot-matrix printer can be resurrected and devoted to label printing. For others, it may be necessary to invest in a dedicated, high-quality, bar-code printer.

A poor-quality label requires a more expensive scanner to read it. With a cheap printer, several frustrating swipes might be needed before the label is decoded.

Other factors to consider are the label's size and adhesive ability.

Continued on page 316

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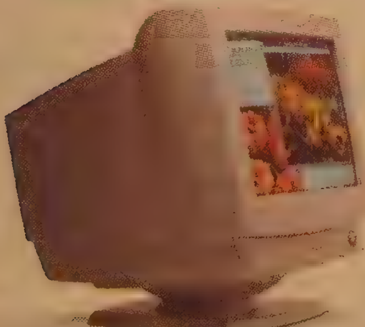

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OS/2 • BY FABIAN PASCAL

OS/2: INI Initiation

Consider applications like, for example, the OS/2 MemStat utility, which monitors and displays system information such as date and time, available memory, swap file size, and free space on drives. It can be configured with user preferences for its position on the Desktop, whether to hide the window controls or not, and which items to dispaly. Figure 1 shows, for example, my preferences.

Most applications have default settings, some of which are user-configurable. Such information must be stored someplace and accessed by the software each time it is invoked. In DOS, each application was responsible for creating a place for and managing such information. Windows, however, had a lot of information to store for itself, which is how the INI(tial settings) file concept came about. In Windows, system information is stored in the WIN.INI file.

WIN.INI is an ASCII file. This means, of course, that users can read its content and edit it. This carries the risk of corruption of either content or format. And since the file is required for Windows operation, the task of parsing it and deciding which errors, if any, can be ignored, and with what consequences, becomes critical. This, as well as the ASCII format itself, also affects performance negatively.

To minimize these problems, Windows stores the information in several INI files, rather than one large one. Application information, on the other hand, is stored in .PIF files, which are binary and maintained by Windows and, thus, are not corruptible by users. But many small INI and .PIF files end up taking more physical space than their actual size and increase the potential for fragmentation.

Table 1

Key Values

Key Name	Hexadecimal	ASCII
HideControls	0000: 0100	“..”
Position	0000: 1710 B200 8201 4003	“......@.”
	0008: 7903 0000 0000 0000	“y.......”
	0010: 0000	“..”
ShowCpuLoad	0000: 0100	“..”
ShowDriveC:	0000: 0100	“..”
ShowDriveD:	0000: 0100	“..”
ShowDriveE:	0000: 0100	“..”
ShowDriveF:	0000: 0100	“..”
ShowMemory	0000: 0100	“..”
ShowSpoolSize	0000: 0000	“..”
ShowSwapfree	0000: 0000	“..”
ShowSwapsize	0000: 0100	“..”
ShowTaskCount	0000: 0000	“..”
ShowTime	0000: 0100	“..”

Listing 3: MEMSIZE keys and key values

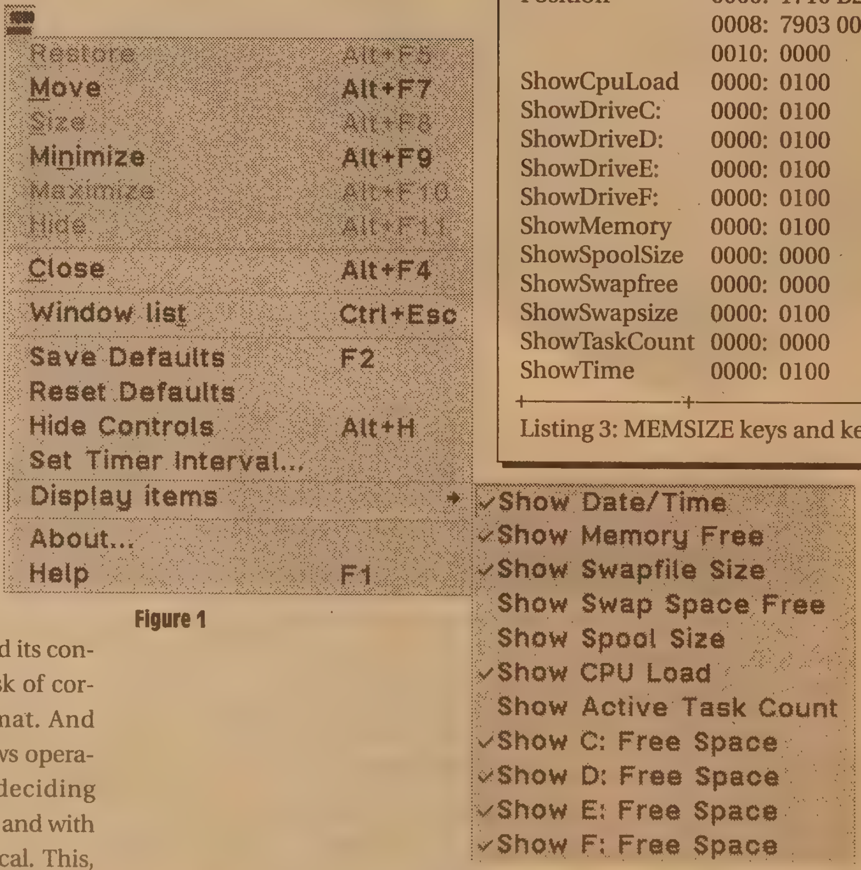
Restore Alt+F5
Move Alt+F7
Size Alt+F8
Minimize Alt+F9
Maximize Alt+F10
Hide Alt+F11
Close Alt+F4
Window list Ctrl+Esc
Save Defaults F2
Reset Defaults
Hide Controls Alt+H
Set Timer Interval...
Display items
About...
Help F1
✓Show Date/Time
✓Show Memory Free
✓Show Swapfile Size
Show Swap Space Free
Show Spool Size
✓Show CPU Load
Show Active Task Count
✓Show C: Free Space
✓Show D: Free Space
✓Show E: Free Space
✓Show F: Free Space

Figure 1

The OS/2 INI Files

OS/2 creates (during installation) only two INI files: OS2SYS.INI stores information about the system (e.g. Desktop objects, installed fonts, and printer drivers); OS2.INI stores application information (e.g. default settings, display and file options). Because they are both binary, corruption by users is not a risk, and efficiency is further improved (HPFS drives lower fragmentation too).

Thus, in principle, OS/2 users should not have to bother with the INI files at all. In principle...

The content and format of the INI files are not documented, but here are some basics courtesy of Larry Martin, the developer of MultiMaint utility (see below). There is a three-tier structure: applications, keys, and values. For each application the Application Name is recorded at the first level; within each application one or more Key Name(s), representing types of information about the application, are recorded at the second level. Associated with each key, its actual value(s) is recorded at the third level. Using MEMSIZE as an example (Table 1), Application Name is MEMSIZE, Key Names correspond with the above settings that can be user-configured. The key values are the actual settings (on/off) and, for the window position on the Desktop, its coordinates.

This application-based structure is extended to record information about not just user applications in the MEMSIZE sense, but also about the system's installed hardware and OS/2 features, as shown in Listings 1 and 2.

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Listing 1

FolderWorkareaRunningObjects
PM_Autumn_Colors
PM_COM1
PM_COM2
PM_COM3
PM_COM4
PM_DD_KyoceraF,LASERJET.Kyocera FS-1500A/FS-1500
PM_INFO
PM_Lcd_Colors
PM_LPT1
PM_LPT2
PM_LPT3
PM_Mono_Colors
PM_Objects
PM_PORT_DRIVER
PM_SPOOLER
PM_SPOOLER_DD
PM_SPOOLER_PORT
PM_SPOOLER_PRINTER
PM_SPOOLER_PRINTER_DESCR
PM_SPOOLER_QP
PM_SPOOLER_QUEUE
PM_SPOOLER_QUEUE_DD
PM_SPOOLER_QUEUE_DDDATA
PM_SPOOLER_QUEUE_DESCR
PM_SPOOLER_QUEUE_PARAMETER
PM_SPOOLER_QUEUE_STATUS
PM_Spring_Colors
PM_Summer_Colors
PM_System_Colors
PM_Windows_Colors
PM_Winter_Colors
PM_Workplace:ActiveHandles
PM_Workplace:Handles0
PM_Workplace:Handles1
PRINT_NEW_OBJECTS

Listing 1: OS2SYS.INI Applications

Listing 2

Blanker
DirEnforcer
EHXMAIN
EPM
EPW_APPL0
EPW_APPL2200
Fax
IconEdit 2.0
INI File Maintenance
MEMSIZE
PMJPEG
PMWP_ASSOC_CHECKSUM
PMWP_ASSOC_FILTER
PMWP_ASSOC_TYPE
PM_Abstract:FldrContent
PM_Abstract:Icons
PM_Abstract:Objects
PM_AlternateInputMethods
PM_ColorCircle
PM_Colors
PM_ControlPanel
PM_Default_Colors
PM_Default_National
PM_DEVICE_DRIVERS
PM_DISPLAYDRIVERS
PM_Fonts
PM_Font_Drivers
PM_IBMBGA
PM_IBMXGA
PM_IMAGECNV
PM_INFO
PM_INSTALL
PM_National
PM_PrintObject:JobCnrPos
PM_ProgramList000
PM_ProgramList001
PM_SPOOLER
PM_Workplace:BaseClass
PM_Workplace:FolderPos
PM_Workplace:IplLoad
PM_Workplace:Location
PM_Workplace:PalettePos
PM_WorkPlace:Restart
PM_Workplace:Startup
PM_Workplace:Templates
PM_Workplace:WindowListPos
Shield
SYS_DLLS
WINOS2
WIN_RES_1024x768x256
WIN_RES_1024x768x65536
WIN_RES_1280x1024x256
WIN_RES_640x480x16777216
WIN_RES_640x480x256
WIN_RES_640x480x65536
WIN_RES_800x600x16777216
WIN_RES_800x600x256
WIN_RES_800x600x65536
WIN_RES_M321
WIN_RES_M322
WIN_RES_M323
WIN_RES_M324
WIN_RES_M325
WIN_RES_M326
WIN_RES_M327
WIN_RES_M328
WIN_RES_M329
WIN_RES_UNKNOWN
WPSbkup

Listing2: OS2.INI Applications

For example, information about Desktop and COM port "applications" is recorded in OS2.INI as follows:

Application Name:
FolderWorkareaRunningObjects
List of the Workareas on the current Desktop. One of the Workareas is the Desktop itself.

Key Name: E:\DESKTOP
Identifies, among folders that are Workareas, the Desktop itself as one.

Key Values
Information about the specific Workarea; appears to contain the WPS Class and Title of the Objects to be opened when the Workarea is opened.

Application: PM_COM1
Supplies the various parameters for COM1 port.

Key Names: DESCRIPTION, INITIALIZATION, PORTDRIVER, TERMINATION, TIMEOUT
Various things that must be set for port COM1.

Key Values
The actual settings for each of the keys.

Some of the installed OS/2 features are actually applications themselves, (e.g. the WPS, OS/2 applets, System Editor, etc.), and their information is recorded in OS2.INI, together with user applications.

Are They Really Transparent?

The content of the INI files at any point in time reflects the status of a system's customized setup. As the user makes changes to the OS/2, hardware, and application setup, more information is recorded in the INI files, which grow and become more and more customized. And here's the rub.

First, no application, including OS/2 itself, makes any provision for removing from the INI files entries that become obsolete (in OS/2 2.0 even when entries were removed, the empty space they occuppied was not being regained, so the files did not shrink anyway; v2.1 empty condenses empty space, but obsolete entries are still, as a rule, not removed). Therefore, as you change your setup, the files keep growing. This affects performance and, if you make lots of changes, at some point it can bring the system to its knees (or even crash it, as some unaware users discovered).

Users aren't the only source of **INI corruption**. Poor management of the files by **the system** can also **damage** them.

Second, users are only a more likely, but not exclusive source of INI corruption.

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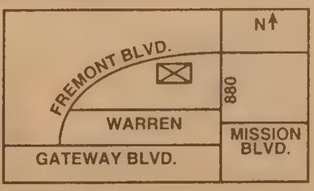

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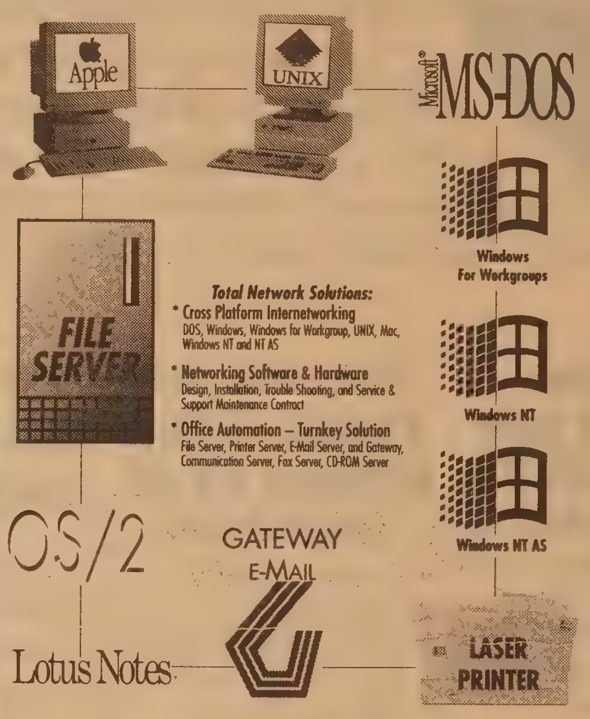

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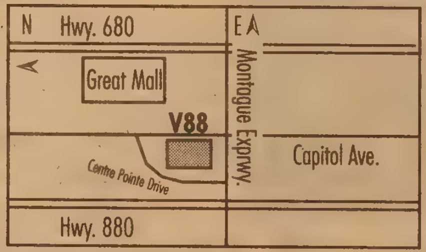

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OS/2 *continued...*

Poor management of the files by the system can also damage them. OS/2 2.0 was quite prone to crashes and INI file corruption, and the lack of cleanup and condensing facilities was (and to a degree still is) contributing to the problem. Since the files are required for system and applications operation, usually you will not be able to even boot if they are damaged.

Third, suppose you want to replicate your customized Desktop on your laptop. In Windows you can move the .PIF files for applications and selected parts of the INI files which are applicable to another system, but this is not possible if all information is in two binary INI files. Thus, because of the (binary) content of the INI files, they can be truly transparent only if cleanup, recovery, and selective customization capabilities are available. But OS/2 does not provide satisfactory solutions.

> With respect to **recovery**, since you can never know when **damage will occur**, you need **continuous backups** of the INI files; otherwise any **customization** between the last backup and **corruption** would be lost.

Weak Solutions

As already mentioned, there are no OS/2 facilities to remove obsolete information.

With respect to recovery, since you can never know when damage will occur, you need continuous backups of the INI files; otherwise any customization between the last backup and corruption would be lost. The simplest way is to make straight copies of the INI files (which preserves obsolete entries).

Because INI files are kept open during OS/2 operation, copying them is unreliable, and access is denied by OS/2. The only way around it is to make copies during the boot process, before they are open. The OS/2 online documentation (Creating and Recovering INI Files) suggests inserting the following statements in the CONFIG.SYS file:

```
CALL= drive:\OS2\COPY.EXE
    drive:\OS2\*.INX drive:\OS2\*.INY
CALL= drive:\OS2\COPY.EXE
    drive:\OS2\*.INI drive:\OS2\*.INX
```

where *.INX are the copies made during last boot. Using dates as extensions, you can keep multiple generations of the INI files, which this approach requires because, for obvious reasons, it cannot ensure recovery of full customization.

Moreover, to substitute backups for currently active damaged INI files requires shuting down the system, booting OS/2 from diskettes, copying the backups over the damaged files, rebooting, and manually redoing any lost customization (and this does not work if OS/2 is installed on an HPFS partition!).

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OS/2 *continued...*

In a rather old OS/2 2.0 Technical Tips paper (available from CompuServe or by fax) IBM describes several procedures to recover the INI files/Desktop in various circumstances of corruption, some using the MAKEINI program and default versions of the files (made by OS/2 itself). But those methods supposed to preserve customization are usually not effective, and those that are effective lose customization.

Finally, neither does OS/2 offer any capabilities to transfer customization between systems. Every change must be manually applied to every system directly.

MultiMaint

Fortunately, several third-party utilities are available to provide one or more of these capabilities. The most comprehensive is MultiMaint, but space does not permit reviewing it here.

MultiMaint is a 32-bit PM application that provides a full diagnostic and maintenance utility in both full-featured and safe versions. It allows the user to:

- view, edit, copy, move, back up, search, compare, size, repair, and otherwise maintain the OS2SYS.INI and OS2.INI files, or any file complying with the same format (repair includes the option to identify and delete obsolete entries)
- back up, repair, and maintain the Desktop
- make object-by-object backups (selective customization) of the Desktop that can be used to move the Desktop among machines or between versions of OS/2 after doing a reformat of the OS/2 partition
- view, copy, move, split, join, test, and otherwise maintain Extended Attributes (EAs). (This article is based in part on information from the documentation of the MultiMaint utility. I would like to thank Larry Martin for his permission to use it.) ■

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RESOURCES:

MultiMaint 3.2, $76.95
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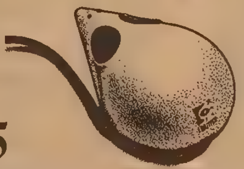

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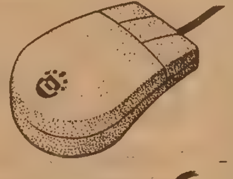

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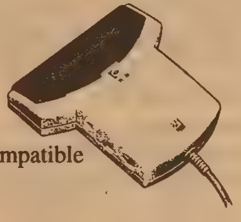

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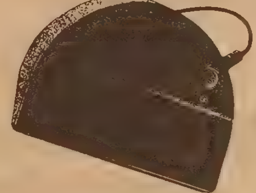

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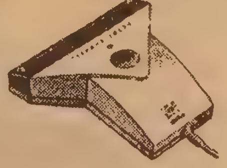

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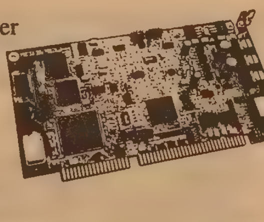

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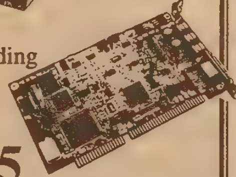

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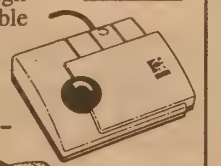

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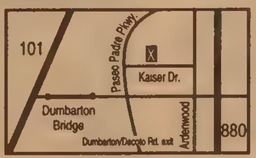

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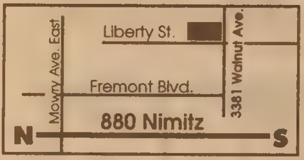

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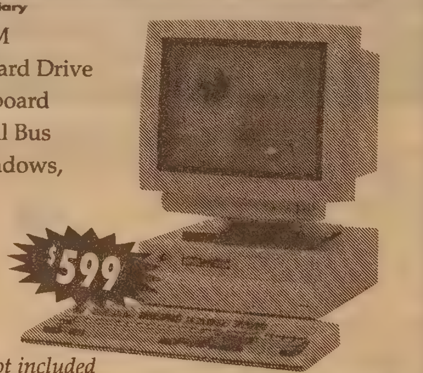

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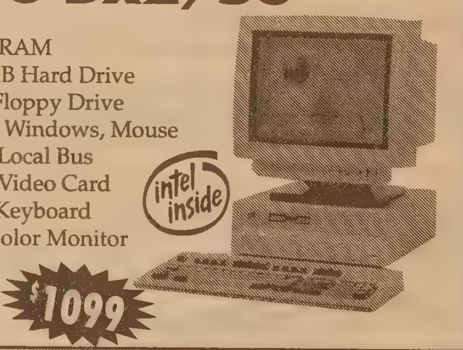

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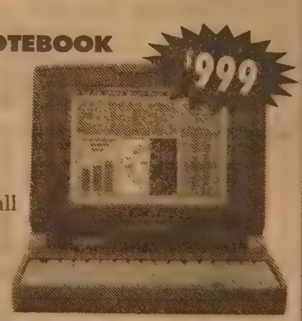

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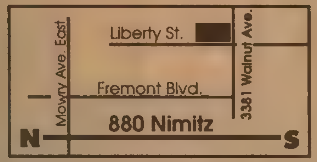

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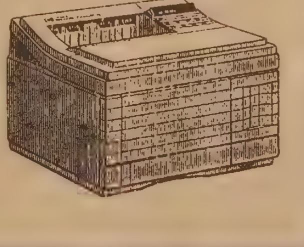

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Securities Industry Considers The Optical Alternative

While there are a myriad of potential uses for optical disk storage technology, the members of the financial community are among the first to identify an ingenious money-saving application for their own industry. On June 18, 1993, in response to a request from the Securities Industry Association (SIA), the Division of Market Regulation of the Securities and Exchange Commission (SEC) issued a "no-action" letter containing a proposed rule change to preservation requirement regulations that would allow broker-dealers to rely on optical disk technology to store business and legal existence records. The SEC concluded that the use of non-alterable, permanent-record-storage optical disks would not violate the original preservation requirements and would, in fact, greatly benefit all of the parties involved.

Until 1970, paper was the sole medium for the preservation of broker-dealers' records. Over the next ten years, microfilm and microfiche were added to the preservation rules as acceptable record formats. More recently, using magnetic media, i.e. conventional computer disks, for records storage has been rejected because alterations to magnetic media cannot be detected. The SEC's recent letter is the most recent provision for an alternative to microfilm, microfiche, or paper records storage.

In support of the use of optical technology, analysis by the SIA estimates that savings for space, equipment, and material expenses, resulting from broker-dealers switching to optical disk from microfilm, could range from $250,000 a year for medium-sized firms to more than $1.6 million a year for large firms. Furthermore, optical storage technology offers increased security and speedier, higher-quality access to records in comparison to the previous options of microfilm, microfiche, or physical formats.

An optical disk is comparable in size to a 12" LP record and can hold seven billion bytes—approximately 3.5 million pages of compressed data. The disks are housed in an automated disk library referred to as a "jukebox." A robotic arm can select and read a particular disk as directed. Optical technology can also quickly provide electronic copies of stored information through computer terminals, where access can be restricted through the use of security codes. This feature allows the broker-dealer to provide original-quality copies of information, while eliminating the risk that the records will be lost, damaged, misfiled, or accessed by unauthorized personnel. These copies can also be provided to the customer or the SEC with greater speed and readability, passing on the benefits of the broker-dealer's technology.

> The Securities Industry Association estimates that **savings** for space, equipment, and material expenses, resulting from broker-dealers **switching to optical** disk from microfilm, could range from **$250,000 a year** for medium-sized firms to more than **$1.6 million** a year for large firms.

New Technology, New Rules

To ensure a smooth conversion to optical technology for the broker-dealer and to guarantee the security and availability of the stored data, the SEC adopted ten new requirements, originally outlined by the SIA, as supplements to the records preservation rules. Seven of the ten requirements are practical guidelines that the broker-dealer can take care of internally with the right paperwork and the correct optical technology system.

These seven requirements dictate that the broker-dealer must inform the SEC of its intention to use optical disk technology and agree to provide any and all stored information promptly to the SEC when requested to do so. Also, in regard to optical system features, the seven requirements specify that the optical disks must be non-rewriteable WORM (Write Once Read Many) disks to ensure that they cannot be altered. The disks must also be automatically indexed and verified for accuracy, and permanently time stamped. Finally, the optical system must also have an automatic audit feature that documents all access to records and any changes made to the stored information.

In contrast, to satisfy the other three supplemental requirements the broker-

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Optical Storage *continued...*

dealer must retain the services of a specialized firm. These three requirements, those regarding hardware and software protection, off-site storage, and downloading of information, can be summarized as follows:

1. The broker-dealer must place in escrow and keep current a copy of the physical and logical file format of the optical disks and indexes, the field format of all different information types written on the optical disks and indexes, and the source code, together with the appropriate documentation and all information necessary to download records and indexes.
2. The broker-dealer must store, separately from the original, in an off-site location, a duplicate copy of each optical disk and index used to store the required records, and store the optical disk and index for the period required for the information preserved on the optical disk.
3. For every broker-dealer using optical storage technology for record preservation purposes, at least one third party, who has the ability to download information from the broker-dealer's optical unit to another acceptable medium, shall file with the Commission or its designee a written contract agreeing to download records into a readable format providing the broker-dealer is unable to do so.

These three requirements are included in the rule change to ensure that 1) the software necessary to download the broker-dealer's records will always be available, 2) the records themselves will always be available, even in the event that the first copy is destroyed, and 3) the records can be downloaded quickly and cost effectively to an acceptable form. Without these additions, it would be extremely difficult to ensure the security and availability of the stored records, and much time and effort might be wasted on fruitless legal battles.

Into The Optical Era

Through careful collaboration and negotiation with the SIA, the SEC has crafted an optical disk program that benefits both the broker-dealers and their customers and regulating bodies. The potential monetary and productivity benefits to all parties resulting from this rule change are unprecedented. In addition, a smooth transition to optical records preservation in the securities industry will encourage other business sectors to follow suit, further spreading the benefits of this technology. ■

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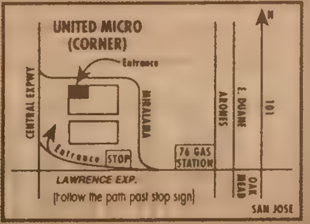

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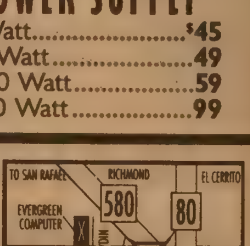

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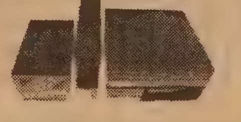

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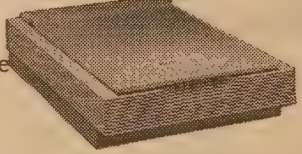

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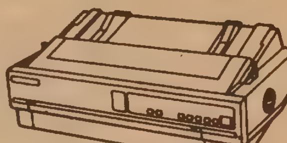

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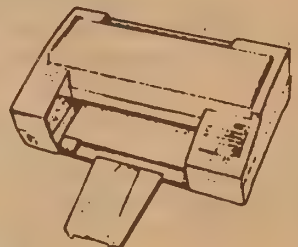

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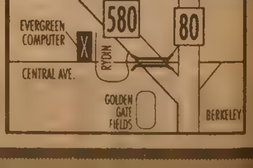

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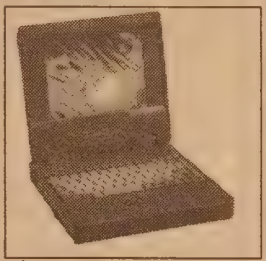

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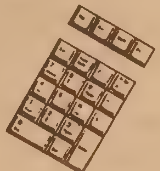

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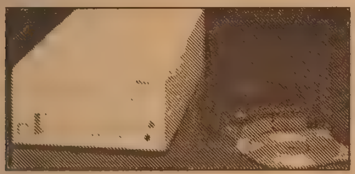

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LANS • BY PETER JOHN HARRISON

The All-Purpose Network Administrator

A Typical Day's Work Requires A Diversity Of Skills

Network administrators usually do more than maintain the health of the network. They are called on to do everything from teach network users how to use their word processors to providing technical support when users can't get their programs (which use the network, but don't run the network) to work the way they want them to.

Who else would you want to call? It frequently seems that some problems are fixed by the mere presence of a network administrator. He or she doesn't have to do anything... Just stand there and watch, while a user sheepishly tries to explain that it really wasn't working a moment or two before you came in.

> **It frequently seems that** some problems **are fixed by the mere presence of a network administrator.**

Oftentimes I chalk these effortless problem solutions up to users just thinking more carefully when there's someone looking over their shoulder. Other times, problems can be tracked down to more than one user trying to access an online database record or file that's been "locked" by another user. Sometimes, though, the problems network administrators are faced with almost defy explanation. Take the case of the recalcitrant mouse.

It had become a morning tradition of sorts. I'd come in, check my phone messages, then try to get a user's mouse to work. It just wasn't tracking right; it moved just fine from left to right and back again, but its up-down movement wasn't smooth, and sometimes it wouldn't track up or down movement at all.

My initial guess was that there had to be some dust or lint in the opti-mechanical mouse mechanism, so I pulled out a can of pressurized air, removed the ball from the mouse, and blew the mouse out. That seemed to solve the problem. At least until the next morning.

Most mice are opti-mechanical mice, meaning that they have a little ball in the bottom that rolls around as you move the mouse. As the ball rolls, it spins two little disks with slits in them—one for movement left and right, another for movement up and down. The mouse tracks its up-down left-right movement by shining a little light at the disk, and as the slits on the disk move, the light blinks through at a photo detector on the other side. Each blink of light tells the mouse it's been moved a certain distance up and down or left and right.

When lint, hair, and other debris get inside the mouse, it can obstruct the light path, causing the mouse to move erratically. Taking the mouse ball out and blowing "canned air" into the mouse usually cleans the dust out. Sometimes you have to open the mouse by unscrewing the cover and blowing air directly at the rotating disks, and most of the time that will fix a mouse that isn't moving well.

Not this time. The next morning it was doing the same strange thing. So, I replaced the mouse with a new unit. Problem solved—I thought. Next morning I was back, scratching my head, wondering why these things always seem to happen early in the morning, before I've had my coffee.

It was driving me crazy. Every morning the mouse would quit, tracking correctly from right to left, but not up and down. Then, every morning a few hours later, without any help from me at all, it would magically fix itself. Then I came in early one day and watched.

The answer was the sun. Early mornings it would stream in through the window next to the desk where the errant mouse sat, bright and beautiful, and with more than enough light to shine through the (as it turned out) not-quite opaque case of the mouse. Once the sunlight had made it into the mouse, it activated the photo detector that tracked "up-down" movement, so the mouse couldn't tell when it was being moved that way.

Once I had a good guess at what the problem was, the answer was simple—pull the window shade down. It wasn't an elegant, technical solution to the problem, but it worked.

So, my tale of mouse and man has a moral. Some problems don't require fancy technical solutions, because sometimes the technology itself is the problem. ■

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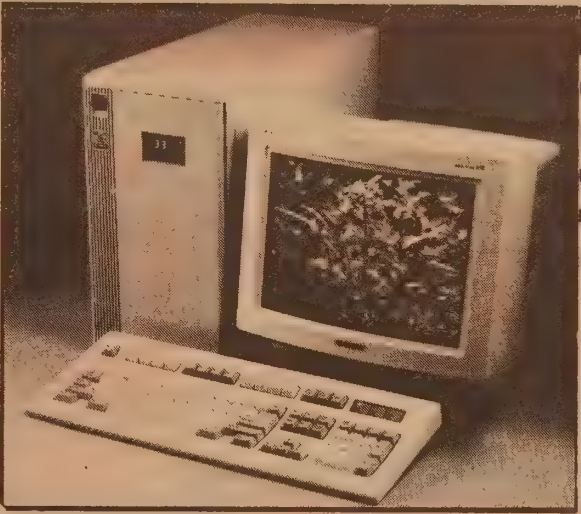

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100MHz $2492

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Disk WinMark	2485
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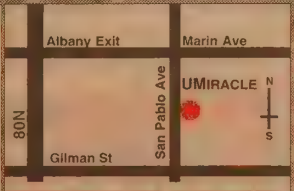

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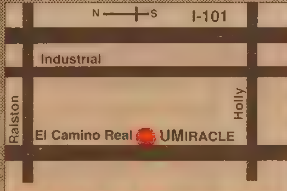

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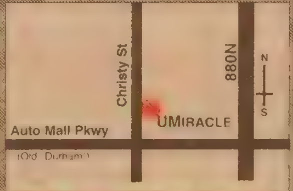

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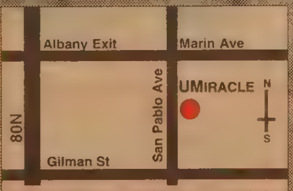

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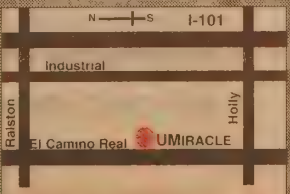

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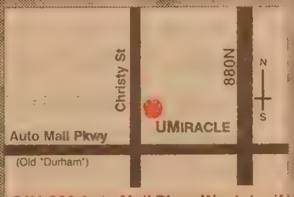

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Help Us Choose The Next MicroTimes 100!

In keeping with our time-honored tradition, our January issue will feature our annual list of leaders and unsung heroes who played a key role in the personal computer industry in 1994.

We already know about most of the usual headline-grabbers, of course, and many companies have hard-working PR departments that keep us informed about their achievements. The people we really want to know about, and feature, are the ones you, the readers, think are important.

So tell us who you think had the most significant impact on the computer industry in 1994. They can be Rich and Famous like Bill Gates; they can be low-profile like your neighbor who teaches computer skills to local youth. They can build fast chips, community networks, or virtual dinosaurs.

Tell us *why* you think we should put them on the list, what particular accomplishment makes them noteworthy. And please tell us where and how we can contact your nominee for more information.

We will give ten free one-year subscriptions to *MicroTimes* to randomly drawn respondents to this survey, so if you'd like to enter the drawing, please be sure to include your name and address at the end of this form.

In order to be considered, your nomination must be received in our Pleasant Hill office by 9 am on Wednesday, November 30. Nominations may be sent by US Mail, fax, or electronic mail.

Thanks for your help!

—eds.

Name of your nominee:
Company affiliation:
Contact information (address, phone):

Why should this person be on the list for 1994?

Your name, address, and phone number
(optional—required for drawing):

Send your nominations to:

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Fax: (510)934-3958

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- Mid-Tower/Desk Top Case w/230W PS
- 101 Enhanced Spill Proof Keyboard
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- 1.44 MB Floppy Disk Drive
- VESA Local Bus Accelerated Video Graphics w/1 MB
- VESA Local Bus 32 Bit IDE Interface
- Built-In 2 Serial/1 Parallel/Game Port
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PENTIUM 60 VLB	$1580
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- 8KB Internal, 128KB External Cache
- 4 MB 70ns High Speed RAM (64MB Max)
- 340 MB Fast IDE Hard Drive
- 1.44 MB Floppy Disk Drive
- VESA Local Bus Accelerated Video Graphics w/ 1 MB
- VESA Local Bus 32 Bit IDE Interface
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486SLC2-66 VLB	$858
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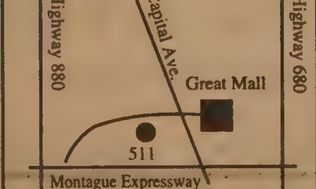

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- 1.44 3 1/2" MB Floppy Drive
- ADAPTEC 2940 PCI SCSI II CONTROLLER
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- 1 High Speed FIFO Parallel
- DIAMOND STEALTH 64 PCI SVGA w/2 MB VRAM (5 YEARS WARRANTY)
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- Keytronics 101 Keyboard
- Full Tower Case w/250W Power Supply
- Microsoft Ergonomical (400dpi) Mouse w/Pad

PCI

INTEL PENTIUM 60/90 Complete System

INTEL PENTIUM 90 MHz	$1959
INTEL PENTIUM 60 MHz	$1659

- INTEL Pentium CPU w/Cooling Fan
- 64 Bit 3 PCI/5 ISA Motherboard (Made by INTEL)
- 16KB Internal Cache, 256KB External Cache
- INTEL Chip Set, Flash AWARD BIOS
- 8 MB (60ns) Memory Up To 128MB on Board
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- 1.44 MB 3 1/2" Floppy Drive
- PCI IDE 2FD/2HD Controller
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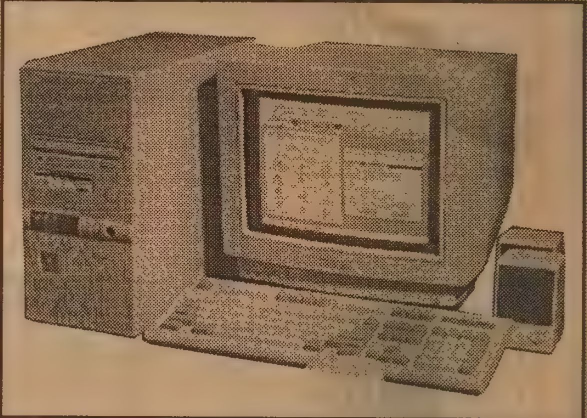
- 1 High Speed FIFO Parallel Port
- Orchid Kelvin 64 PCI SVGA w/1MB DRAM
- CTX 14" NON-INTERLACED Full Screen (1024x768 .28dp, 2 YEARS WARRANTY)
- Keytronics 101 Keyboard
- Med. Tower Case w/230W Power Supply
- Microsoft Ergonomical (400dpi) Mouse w/Pad



VESA

Multimedia Pentium/486 Complete System

PENTIUM 90 MHz	$2059
PENTIUM 60 MHz	$1899
486DX2-66 MHz	$1409
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- 4 MB MEMORY (for 486 System or
- 8 MB MEMORY (for Pentium System)
- 1.44 MB 3 1/2" Floppy Drive
- 420 MB (12ms) IDE Hard Drive
- VLB 32-Bit IDE 2FD/2HD Controller
- 2 Serial, 1 Parallel Ports
- VLB Orchid Kelvin 64 w/1 MB DRAM
- CTX 14" Non-Interlaced Full Screen (1024x768, .28dp) Monitor
- Keytronics 101 Keyboard
- Med. Tower w/230W Power Supply
- Serial Mouse w/Pad
- 14.4 Int Fax Modem w/Quicklink II CompuServe Starter Kits
- Double Speed CD-ROM
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- 16K Internal Cache, 256K External Cache
- OPTI Pentium Chip Set, Award BIOS
- 8 MB (70ns) Memory Up To 128 MB On Board
- 420 MB (12ms, 2 Years Warranty) IDE Hard Drive
- 1.44 MB 3 1/2" Floppy Drive
- VESA IDE 2FD/2HD Controller
- 2 Serial Ports, 1 Parallel Ports
- Avence Logic PCI SVGA w/1MB DRAM
- CTX 14" NON-INTERLACED Full Screen (1024x768 .28dp, 2 Years Warranty)
- Keytronics 101 Keyboard
- Med Tower Case w/230W Power Supply
- Logitech Fist Mouse (400dpi) w/Pad

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- VLB 32-Bit SVGA Card w/1 MB DRAM, Windows Accelerator
- CTX 14" Non-Interlaced SVGA Monitor (1024x768 .28dp 2 Year Warranty)
- Keytronic 101 Keyboard
- Mini Tower w/230W Power Supply
- Microsoft Compatible Serial Mouse w/Pad

Look Through The Systems On This Page. If You Don't Find The Perfect One For You, We're Happy To Help You Get Just What You Need! So You Can Upgrade, Change, or Configure From Scratch To Meet Your Specific Needs.

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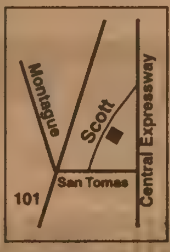

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	EBD	167811-001	225
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Deskpro 386/20e, 25e (E. Board)			
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AutoDesk ADI
WordPerfect 5.1, 6.0

Specification:
Video and Graphics Accelerator: Alliance Promotion 3210

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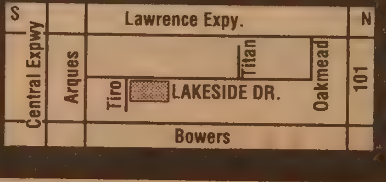

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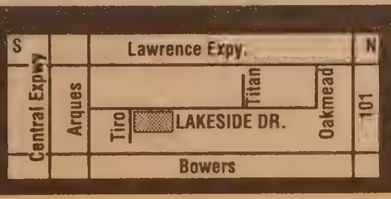

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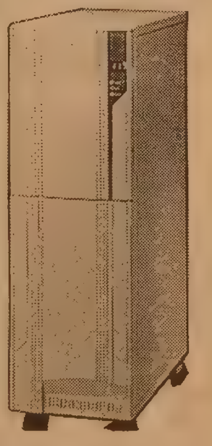

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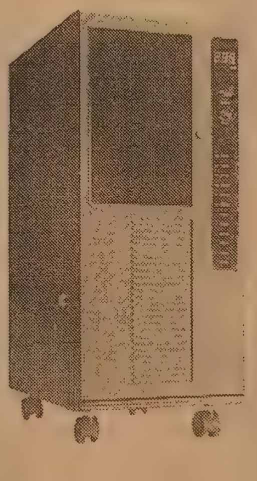

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FIOPPY DRIVES

YE Data 1.2/1.44MB	**$41/33**
Teac 1.2/1.44MB	**$46/35**
Teac Dual Floppy 1.2 + 1.44 MB	**$91**

HARD DRIVES

2.5" NOTEBOOK DRIVES

QUN 127/call 16msec	$225/call

IDE

(Hard drive prices change often-please call!)

Dae Young 120 (3 month warranty)	**$119**
MXT 170 MB17 msec	**$139**
CON 210 14msec	**$148**
CON/WD 250MB 14msec	$159
QTM 270/MXT 290MB 15ms.	$171/161
WD 340/**MXT 340MB** 12/14 ms.	$184/**$165**
CON/QTM 340MB	$189
CON 420MB	**$189**
WD 425MB 13msec	$198
QTM 540 MV/LP	**$214/242**
WD 540 12msec	$222
MXTR 540 8.5/12 msec	**$238/235**
CON 540MB 12msec	$249
WD 700 12msec	$293
WD/CON 1.0 GB	$438/call
MICROPOLIS 1/1.8GB 10ms.	$629/925

SCSI - 3.5"

QTM 42MB SCSI	**$69**
CON/QTM 170MB 17msec	$189
CON 212MB 12 msec	$202
MXTR 213	$202
MXT 290	$165
MXT 340MB 13 msec	$188
CON 340MB 13msec	$call
QUN 540MB LPS FAST	**$254**
MXT 540MB /CON 540 8/12 ms.	**$312**/319
Quantum 700	**$389**
QTM 1.4 GB 10msec 5 year	**$746**
DEC 1.07GB DSP3107 9ms	$657
DEC 1.6GB DSP3160 9ms	$886
Quantum 1.08 GB	**$540**
MICROPOLIS 1/1.8GB 10ms	$629/825
HP1.2GB 10.5msec	$679
ST1.2GB ST31200N 9 msec	**$551**
Quantum 2.1 GB	$978
ST12400N ST2.1GB 9MS	**$1019**
DEC 2.1GB DSP3210 9ms	$1259
ST 3.4GB ST43400N	$1761
ST 15150N 4.29GB 8msec	$2354
ST 9GB ST410800N	$3618

SCSI - 5.25"

DEC 3.0GB DSP5300	$2046
DEC 3.5GB DSP 5350	$2312
DEC 4.0GB DSP 5400	$2488

SUPER HARD DRIVES

Seagate Barracuda 3.5" HH (8 msec avg. seek, 4.17 msec lat., 7200 RPM) 1.7/2.5/4.2 GB	$1183/1586/2462

FLASH CARD HARD DRIVE

ST 75A 1.8" 5.2MB IDE<1.5MS	$484
ST 710/720A 1.8" 10.4/20.9MB	$888/1177
ST 740A 1.8" 41.9MB IDE<1.5ms	$2068

EXTERNAL HRD. DRV. SUBSYSTEM

FOR EXT. HARD DRIVE,	ADD $99

TAPE DRIVES

(<500MB TAPE-BACKUPs)

Colorado 120 / 250MB	**$99/159**
Conner 250MB w/Cassette	**$144**
Colorado KE-10 External kit with card	**$105**
Colorado External port card	**$37**
FC-10 high perf card	**$85**
Colorado Trakker 250MB	**$329**
Archive Viper 250MB hh SCSI I/E	**$325/399**

(>500MB for PC / SERVER)

Viper 525MB hh SCSI Int/Ext 6MB/sec	$440/525
Mountain FS1200 4GB I/E	$1545/2175
Conner-Python 4320 NT 2.0GB DAT 3.5"	$750
Conner-Python 4324RP 4.0GB DAT 3.5"	$856
Colorado 2.4 / 4.0 GB Qic 5.25	$859/975
HP 2GB DAT 4mm Int/Ext	$862/952
HP 4-8GB 35480 DAT 4mm Int/Ext	$979/1090
HP 8-16GB DAT 1533A 4mm Int/Ext	$1149/1229
WANGTEK 5100 1.0GB 4mm Int/Ext	$639/769
WANGTEK 3100/3200 2/4GB 4mm Int.	$879/1035
WANGTEK 3400 8-16GB 4mm Int	$1099
EXABYTE 4200/4200C 2/4GB	$829/949
EXABYTE 8205 5GB 8mm 5.25 I/E	$1365/1595
EXABYTE 8505 10GB 8mm Int/Ext	$2050/2140

(above drives require special contr & soft drivers)

TAPE BACKUP DRIVERS

Novaback for DOS//OS/2	$65
Novanet Multiuser NLM	$279
ARC Serve Single	$125
SYTOS for DOS/NOVELL, GEN	$120
Conner Backup Exec for Dos/Win v3.3	$79
Conner Backup Exec for Netware v3.1	$259

MAG/OPTICAL (Rewritable)

Ricoh 128MB 3.5" Internal	$532
Panasonic LF-7010 1GB 5.25	$2799
HP 1.3GB 5.25" SCSI-2 EXT	$2799
MAXOPTIC 1GB Tahiti IIM 35msec	$2260

REMOVABLE DRIVES

Syquest 44MB Dr.	$249
W/Ext Case, Cables, Cart, Cont	$379
Syquest 88/105MB Dr.	$308/389
Bernoulli 44/99 Insider	$789/840
IDE: Upto 1GB removable kits	$39
SCSI: Upto 1GB Removable Kits	$138

DISKETTES & CARTRIDGES

Floppy 1.44 Bulk 20+/100+/500+	**$.49/.39/.34**
Floppy 1.2 Bulk	**$.44**
Tape DC2120 250MB..Formatted	**$16**
Tape DC 6250 5.25", 1/4" Cartridge	$25
Tape DC 6525 5.25", 1/4" Cartridge	$30
TK50 for DECs	$24
DAT 4mm 90 mtr HP/OEM	$20/14
DAT 8mm 112 mtr.	$14
Syquest 44/88/105MB Cart	$62/94/85
Bernoulli 44MB/90MB 3Pk	$289/298/264
Mag-Opt 600MB/650MB 5.25" Rewrite	$86/86
Mag-Opt 1.2/1.3 GB Rewrite	$108/90
Mag-Opt 600/650MB WriteOnce	$76/76
Mag-Opt 1.2/1.3GB WriteOnce	$90/90
Mag-Opt 128/230MB 3.5"	$35/41
Mag-Opt 650/1.3GB WORM 5.25"	$144/144

VIDEO ADAPTERS & MONITORS

ISA/EISA ADAPTERS

MGP	$13
VGA 256k	$27
Trident 512K/1MB	$37/58
Tseng ET4000 1MB	$73
Mustang 1MB Window Accel	$58
Hercules Graphite Pro 1/2MB	$274/418
ATI Ultra Grpx 1MB w/Mouse	$214
ATI Ultra 8514 1 MB VRAM(Dual mon. cap.)	**$176**
ATI Ultra Pro EISA 2MB	$294
AMI Fast View EISA VGA Graphics w/1MB	$221

VLB/PCI ADAPTERS

(wm = winmark ver2.5)

MustangVT Trident VLB 1/2MB	**$65/110**
MustangVC Cirrus logic VLB 5428 1/2	**$74/119**
MustangVS S3-805 VLB 1/2MB	**$65/110**
MustangET4000 VLB 1/2MB	**$88/138**
Spider 32 1/2MB,20 WM	**$87/132**
Spider 32 Plus 1MB	**$95**
Spider 64 1/2MB VLB/PCI	**$117/160**
Spider BlackWidow+ 1/2MB PCI/VLB	**$160/221**
Spider Tarantula 2/4 MB	**$255/395**
DIAMOND Stealth 24VLB 1MB	**$132**
DIAMOND Stealth 64 1/2MB DRAM	**$143/193**
DIAMOND Stealth 64 1/2MB VRAM	**$294/468**
DIAMOND ViperSE 2MB VLB/PCI	**$255/294**
ORCHID Celsius 1/2MB	$216/266
ORCHID Kelvin 1/2MB PCI/VLB	**$133/179**
Hercules Dynamite Pro 1/2MBPCI/VLB	**172/225**
Hercules Graphite Pro 1/2MB	$274/418
ATI Graphics Wonder 1MB DRAM PCI/VLB	$115
ATI Ultra Plus 2MB DRAM PCI/VLB	$171
ATI Graphics Exp. 2M B DRAM PCI/VLB	$210
ATI GraphicsProTurbo 2/4MB PCI/VLB	$288/499
Cirrus Logic 5434 PCI 1/2MB	$101/152
S3-864 PCI 1/2MB	$98/148
ET4000 PCI 1/2MB	$104/154

CAD SPECIALITY ADAPTERS

NUMBER NINE - #9GXI/GXE

L10 ISA or VLB Retail/Bulk	$249/236
L11 ISA or VLB Retail/Bulk	$359/339
L12ISA&VLBRetail/Bulk	$420/406
L14 ISA&VLB Retail/Bulk	$639/589
64 1MB/2MB....PCI or VLB	$175/249
64 PRO 2MB/4MB	$365/549

MATROX

MGA-VLB 2/Plus	$409/459
MGA-VLB 4/200	$845
MGA-IMP 3A&V	$699
MGA-PRO 4.5V/4.5+z buffer	$1095/1379
MB memory upgrade	$209
MGA-PCI 2/2Plus	$365/409
MGA-PCI 4/4-200	$616/768

METHEUS CORPORATION

Premier 928 VL2(1MB)/4(2MB)	$324/559
Premier 928 ISA 1M/2M/4M	$297/422/725
MODULE 1MB Memory	$119
1104 Plus 256 Hz, MultiDisplay	$1295

(We do not have the high end CAD adapters and monitors on display and carry only a few in stock - these are on Just-In-Time inventory basis - please place orders in advance-the prices in parenthesis are on a cash basis only)

14" MONITORS

MONO

Mono 14" amber/white	**$72**
Mono 14" SVGA	**$87**

VGA/SVGA

SVGA 14" 1024 x 768 .39	**$191**
SVGA 14" 1024 x 768 .28 Int	**$210**
SVGA 14" 1024 x 768 .28 NI	**$220**
Black SVGA 1024 x .28 I/NI	$270/282
Kanaka 14" Int/NI w/Hitachi Tube	**$233/256**
CTX 14" 1024 x 768 .28 Int.	**$238**
CTX 14" 1024 x 768 .28 NI	**$244**

CAD MONITORS

Miscellaneous

KFC15".28 1280x1024NI wo/w Digital	**$306/379**
Mitac 15" .28 1280 LowRad,Energy*	**$315**
Orchestra Tube 17" 1600x .26	**$615**
KFC 17" .26 1280x1024 NI w/o digital	**$629**
KFC 17" .26 1280x w/digital display	**$685**
Mitac 17" .26 1600x NI Energy*	**$689**
Viewsonic 6E 14" .28 NI Green	**$262**
Viewsonic 15E 15" 1024x .28	$365
Viewsonic 15 .28 1280x MPR2	$425
Viewsonic 17" 1600x1280 .27	**$889**
Viewsonic 20/21	**$1525/1659**
MAGNVX20CM64 20", 1280, .31	($1110) $1150

NANAO

T560i,.26 1280NI,MPR2	($1415)$1490
T660i 20",.30 1280NI MPR2	($1999) $2110
F760iw21".31,1280NI,MPR2	($1919) $2015

NSA-Hitachi

CM 1586 15" .28 1280x	$415
NS 1764 17" .28 NI 1280x	($795)825
CM1797 17".28.1280NI,MPRII	($975)$1099
CM2095 20" 1280 Anti Glare	($1239) $1295
CM 2198 21" .28 1280NI	($1920)$1989

Hitachi America - ACCUVUE

PS-20,.31dpi 1600x NI	($1555)$1618
PS-21,.28dpi 1600xNI	($2029)$2099
PS-21A,.28dpi 1600xNI	($2149)$2259

Sony

15SF 15" 1280x .25	$445
1730 CPD	$908
GDM17SE 17" 1600NI .25	($955)$999
GDM20SE 20"	($1865)$1939

Nokia

17" 447B Trin.25dpi,1280x	($927)$975
21"445M.26,1280NI	($1955)$2029
21"445X.26,1600NI	($2566)$2615

Sampo

Sampo KDM1767 17" .28	($668)$695
Sampo 1777 17" .28 Microp	($749)$785
Sampo 2055 20" .31	($1040)$1075
Sampo KDM2077 20" NI 1280 .31	($1460)$1520

NEC

2V 14" NI .28 1024x	$349
3V/4FGE	$485/($635)$659
5FGE/FGP17".28,	($999)$1045/($1125)$1165
6FGP21",.28,1280NI	($2005)$2095

MAG

MX15F 15"MPR II	($459)/$477
DX15F 15"	**$369**
DX 17F 17" .26 1280x	($645)/$669
MX17F,17".26,1280NI,Mic Org	($758)/$795

Prices given in bold are usual stock items, prices not in bold are special order items and require a 20% deposit, are not returnable, and take 2-3 days lead time.

CASH COUPONS

HARD DRIVES

CONNER
212/420IDE
$149/188

HARD DRIVES

QUANTUM
540 MB IDE
$ 211

HARD DRIVES

Western Digital
730MB/1GB
IDE
$293/442

HARD DRIVES

QUANTUM 1.08/2.1 GB
9.5MSEC/5YEARWARNTY
$534/982

NETWORKING

16BIT NE2000 COMP COAX/TP	$29
16 BIT NE2000COMP COMBO	$39
INTEL 10BT FLASH	$99
8 PORT TP HUB W/AUI	$159
16 PORT TP HUB W/AUI	$359

MULTIMEDIA

8BIT SOUND C/KIT	$39/59
MITSUMI 1X CD ROM	$79
MITSUMI 2X INT	$119
TOSHIBA 2X 3401 INT	$239
NEC 510-CDR 3X	$264
Texel/TEAC Quad SCSI CD	$419/265

See our ad on
AMERICAN ONLINE
Keyword
MERCURY CENTER
Enter Code
IASA

MULTI MEDIA

CD-ROMs

IDE TYPE CD-ROMs

CD-ROM-#1-of-the-Month
Mitsumi Kit 350msec, 150 KB/S.........$79

Panasonic 562 DblSpd.320ms, 300kb/sec	**$139**
Mitsumi Dbl-Spd 250ms,300kb/sec	**$126**
SONY CDU 33A 320ms/300kb	$149

Super Multi-Media Complete Kit on Sale!
Mitsumi CD-ROM, 150KB/sec, 350ms
8 bit Sound Blaster Compatible Card (for Win)
Quickshot Warrior joystick
Shielded PC spealers
Deluxe model microphone
Award winning Apogee sound-supported games; all for.................$123!!!

SCSI CD-ROMs

NEC 3X 510CDR Ext 195ms,450KB/sec	**$367**
NEC 3XP Portable 250ms,450KB/sec	$460
NEC 4X Pro 16bit 180ms/600kb sec	$889

CD-ROM-#2-of-the-Month
NEC 3X CDR-510 Multispin,
195ms,450KBS....$281

TOSHIBA 3401B/E 200ms, 300kb/s I/E.	**$255/339**
TOSHIBA 4101 B/E 235ms,300Kb/sec Int.	$210
Plextor(texel) 3028/5028 240/335..I/E	**$255/339**
Plextor Quad speed bare OEM	**$431**
TEXEL Quad OEM	**$277**
SONY CDU 561, 295ms, 300kb/sec	$286
Future Domain Comp. SCSI CD-ROM Kit	$69

AUDIO CARDS & MPC KITS

Hyena Snd Bister Comp. 8bit Sound Card	**$39**
Hyena w/ Speaker, Joystck, mcrphn, game.	**$50**
Quickshot 16 w/ speakers,game,card etc	**$92**

MEDIA VISION

Pro Audio basic 16bit	$58
Pro Audio Studio 16/Power Pack	$125/59
Fusion Double CD16 Kit Int	$289
Pro 16 Multi-Media System1 SCSI /II	$649/449
Pro Movie Studio	$173

CREATIVE LABS

Sound Blaster Deluxe 8 bit	$59
Sound Blaster 16 BasicVE Retail/OEM	**$95/77**
Sound Blaster MCD/w-ASP	**$135/166**
Soundblater OEM MCD/w-asp	**$90/135**
Sound Blaster SCSI/SCSI2 ASP	**$139/202**
Sound B OEM 16 SCSI/ w/ASP	**$119/165**
Discovery 16 kit	$319
Sound Blaster Voice Editor	$55
Wave/Video BlasterSE	$179/285

MISC MULTI-MEDIA PRODUCTS

Encyl 1:Encyl,Animals,World/US Atlas	**$39**
Educational 1 plus Family health	**$68**
Joystick	**$15**
Logitech Fotoman Plus Digital Camera	$565
Logitech SoundMan 16 v1.1/Wave	$79/185
Video Logic Captivator Kit win3.1	$369
Midi Mate/CDPC XL	$49/1059

PLOTTERS, DIGITIZERS, SCANNERS & PRINTERS

PLOTTERS

HOUSTON INSTRUMENTS

V50 INKJET A-C,2MB BUFFER	$1298
HiPlot 7100 A-D 8 pen,LCD display	$2575
HiPlot 7200 A-E 8 pen,LCD display	$3395
DMP-162R A-E, 8 Pen, Roll Feed	$3958

DIGITIZERS

SUMMAGRAPHICS

III 12x12 w/16btn or 4bt & Pen	$312
III 12x18 w/16btn or 4bt & Pen	$539

KURTA

XLP 12x12 w/4btn & Pen	$225
XLP 12x18 w/16btn or 4btn & Pen	$429
XGT 12x12 w/4Btn	$322
XLC 36x48 w/16btn or 4btn&pen	$1520

CALCOMP

CALCOMP 12 X 12/12 x 18	$299/618
CALCOMP 18 X 24/24x36	$1275/1399

SCANNERS

LOGITECH (HAND-HELD)

SCANMAN-color Phototouch/OmniPg	$347/398
SCANMAN 256GS wo/ w OmniPage	$153/195
SCANMAN 32GS w/ OmniPage	$113
Scanman Power Page Slide	$404

MICROTEK

Scanmaker II/IIXE 1200/600dpi w/OCR	$521/899
Scanmaker IIHR 600dpi	$1055
Scanmaker IIG/IISP color cap 600dpi	$392/769

MUSTEK (Hand-held)

ScanMagic256, 400dpiw/perceive	$109
ScanMagic Color,400dpi,256 grays w/perc	$219
GrayArtist,800dpi,256 grays w/perc	$134
Colorartist Pro,800dpi,256&colr w/per	$249

MUSTEK (Flatbed)

Paragon 600(dpi)24 bitclr,Photoshop	$549
Paragon1200(dpi)24 bitclr,Photoshop	$839

UMAX Technologies

UC 630 PC,1200dpi max,24bit /256gray	$675
UC840,1600dpi max,16.8 million clrs	$889
UC1260,2400dpi max,16.8 million clrs	$1185
UC1200SE,2400dpi max.,30 bitclrs	$2550

Hewlett Packard

HP IICX Color scanner	$891

EPSON

ActionScanning 300/ES 1200C	$815/1295

Miscellaneous

Info 3gs 300dpi sheet fed	$375
Info SF-6C 600dpi sheet fed	$450
Relysis 9600 800dpi color flatbed	$2995
Tamarack 6000/8000C	$729/853

Fujitsu (Flatbed)

M3096E/G 11.7x17"400dpi 20ppm	**$4222/4894**

PRINTERS

Miscellaneous

Star Micrnix NX1001 9 Pin.120/220V	$134/144
Star Micronix 220v quantity of 100 only	$135
IGOR 132 9Pin Wide **220V** (Cyri..).in stock... ......with any purchase	$110

EPSON

Action 2250 9 pin,50sheet,240cps	$115
LQ 2550	$903
LQ570+ 24 pin wide, 269 cps, 11 fonts	$249
LQ 1070+ 24 pin Wide,252cps,11fts	$369
LQ 1170 24Pin ,2 resident fonts	$609
Stylus 300 Inkjet 360dpi,150cps	$221
Stylus 800 Inkjet 360dpi,150cps,100sht	$283
ActionLaser 1500 300dpi,6ppm,1mb	$655
Actionlaser 1600 600dpi/Stylus color	$947/565
DFX-5000 9pin,wide, high spd. 533cps	$1485
DFX-8000 9pin, wide high spd1066cps	$2345

CANON

BJ200e/230,360dpi,49k,7fnts,4ppm	$255/395
BJ10SX,110cps,360dpi,**Portable**	$241
BJC 600 Color,240cps,360dpi,100shtfd	$499
BJC 820 Color,240cps,4ppm,1MB	$1467

OKIDATA

OL 380/321 dotmatrix,24Pin,23K	$217/420
OL400e/410elaser 4ppm, 300dpi	$489/635
OL810, 8ppm, 300dpi	$875
OL830 Plus/850, 8ppm w/ 2MB ps	$1055/1165
OKI ML520/521 9 pin 64K	$359/475
OKI ML590/591 24 pin..auto form	$417/561

PANASONIC

KX-P2124, N-Carr, 320cps, 360dpi, 12fnts	$318
KX-P2624/2023	$381/197
KX-P1624, W-Carr, 192cps, 360dpi, 14fnts	$383
KX-P 1150/2023	$149/199
KX-P4410,5ppm,300dpi,28fnts,512k	$529
KX-P4440/4430	$999/655

CITIZEN

GSX 145 24Pin wide,160cps,360dpi	$349
GSX200 9pin,Narr/wide	$168/289
GSX220 24pin/CTZ projectII 3ppm	$179/279
GSX230 24 pin.8 fonts, 270cps	$221
(color option for Citizen 80 col printers	*$45)*
GSX240 24 pin 300cps, 13 fonts	$281
Notebooks CTZPN48/CTZNP-IBM	$284/326

HEWLETT PACKARD

Deskjet 540 300dpi,120cps,16k	$289
Deskjet 560C Color,3ppm,300dpi,80k	$455
Deskjet 1200C/ps Color2MB	$1357/1837
HP 4+/4P/4SI/4L/4V	$1351/907/2835/619/1825
4M+/4ML/4MV/4 SiMX	$1819/955/2645/3925

NEC

Pinwriter3300 24pin wide,360dpi,80K	$326
Pinwriter6200 24pin narrow,360dpi,80k	$399
Pinwriter9300 24pin wide.360dpi 333draft	$839
Silentwriter superscript610,6ppm,256k	$471
Silentwriter1097 600dpi,7mb	$1365

FUJITSU

10/10W Laser,10ppm,1/2mb 14/35fts	$830/942

All printers: Cash basis only and come with the Original Manufacturer's warranty. Please call for lead time. No returns on any printer purchase with this pricing.

MEMORIES, MATH-COs & CPUs

MEMORIES for IBMs

SIMMs

256 x 9 (3 chip)70NS	**$11.75**
1M x 9 (3 chip)-70NS BP	**$38.75**
1M x 9 (9 chip)-70NS Major brand	**$39.75**
4M x 9 (3 chip)-70NS BP	**$122**
4M x 9 (9 chip)-70NS	**$142**
4Mx8-70 maj	**$128**
1M x 9 (3 chip)-60 Major brand	$41
4M x 9 (9 chip)-60NS	$159

ESIMMs(72 Pin)

256x36-70NS	$55
512x36-70NS	$95
1x36-70NS	**$169**
2x36-70NS	**$325**
4x36-70NS	**$528**
8x36/16x36-70	**$1117/2235**
1x36-60NS	$158
2x36-60NS	$329
4x36-60NS	$635
1x32-70 NS	**$148**
2x32-70NS	**$295**
4x32-70NS	**$469**

DRAMs

1x1-70/80NS	$5.50/5.25
256x1-70/80NS	$1.75/1.60
256x4-70/60NS	$5.75/5.50

LASER EXT. MEMORIES

HEWLETT-PACKARD

HP IIP, IIP+,III,IIID,IIIP 1/2/3/4MB.	$75/114/155195
HP II, IID 2/4MB	$124/199
HP IIISi 1/4MB	$76/204
HP IV 4/8MB	$165/365
Deskjet 500, 500C, 550C.....256K	$88

PANASONIC

KXP 4410/20/30 ......1/2/3/4MB..	$98/148/175/215
KXP 4450 1MB	$137
KXP 4455 ....2MB	$164

OKIDATA

OKI 400 ....1/2MB	$98/
1 1	9
OKI 800/820 ....2/4MB	$123/193
OKI 810 ....1/2MB	$111/189

CPUs & CPU FANS

INTEL

386 DX33	$40
486 SX25/33	**$64/86**
486 DX 33	**$123**
486 DX 50	**$247**
486 DX2 50	**$239**
486 DX2 66	**$223**
486 DX-4 100	$505
Pentium 60MHz	**$395**
Pentium 66MHz	**$535**
Pentium 90MHz	**$609**

AMD

386 DX 33/40	$47/48
486 DX-33	**$144**
486 DX 40	**$153**
486 DX2 50	**$199**
486 DX2 66	**$205**

CYRIX/TI

486 DLC 33/40	$62/68
486 DX 33/40	**$108/114**
486 DX2-50/DX80	**$132/242**
486 DX2-66	**$189**

CPU Fans

486 heat sink and fan	**$7.95**
Pentium 60,66/90	**$12/15**

MATH-COPROCESSORS

INTEL

80387 SX 16/20/25	$45/64/75
80387 DX 16/20/25/33	$35/40/45/80

Overdrives - call for latest prices

IIT

3C87SX-16/20/25	$39
3C87SX-33	$39
3C87DX-25/33/40	$39

CYRIX

83S87SX 25	$39
83S87SX 33	$39
83D87-33	$41
83D87-40	$41

WEITEK

4167-25	$265
4167-33	$425

Special Terms and Conditions for this Section: CPU and Memory prices change on a daily basis; please call for the latest prices. These products when bought without systems come with a minimum 15 day warranty - please inquire. We do not stock many of the above products - please call for availability.

SOFTWARES

For Networking, Communications, Tape Storage Drivers, Networking Drivers, Multi-Media and Speciality Softwares also look in the corresponding sections.

UTILITIES

Norton Utilities V 7.0/Anti-Virus v2.1	$116/89
QEMM 386 V7.0	$69
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Intel EtherExpr 16 MCA C/16 MCA TP	$177/177
Intel EtherExpress 32 EISA/Flash 32C	$427/232
Intel EtherExpFlas TP/C 5/20pk	$141/632/2368
SMC Ethcard 16 Elite Ult Cx/6 Pk	$109/581
SMCEthcardEliteUltraCOBO 1/6	$125/625
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SMC Token Ring Adapter 16/4	$261
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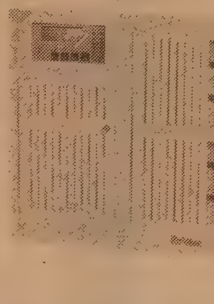

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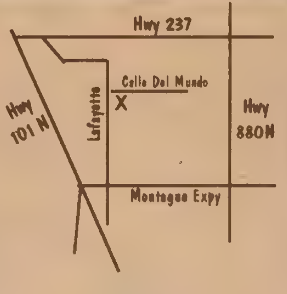

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Genoa 8500VL 24-Bit Acc.	$95
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*SMC Elite Ultra 16-bit Combo (Single/6 Pak/24 Pak)	$99/549/2049
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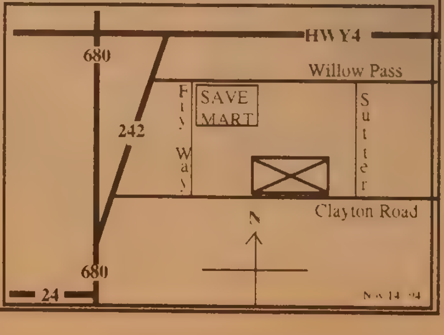

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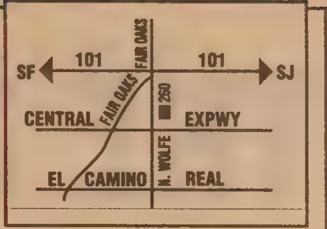

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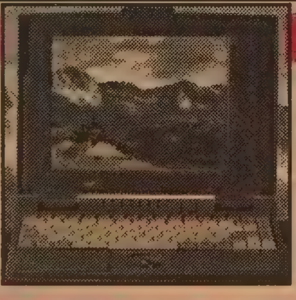

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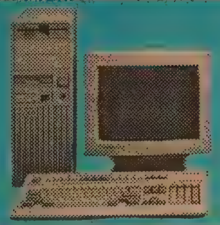
- Tower or Desktop Case w/power supply
- 101 Enhanced Keyboard



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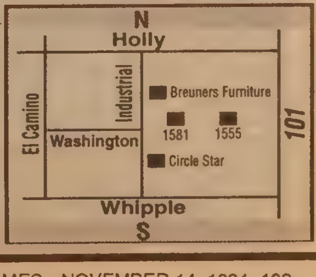

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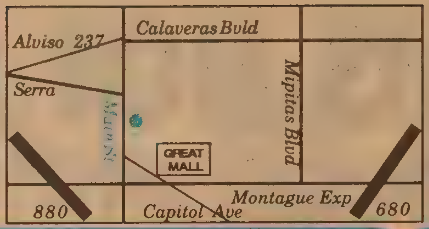

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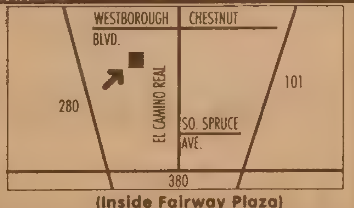
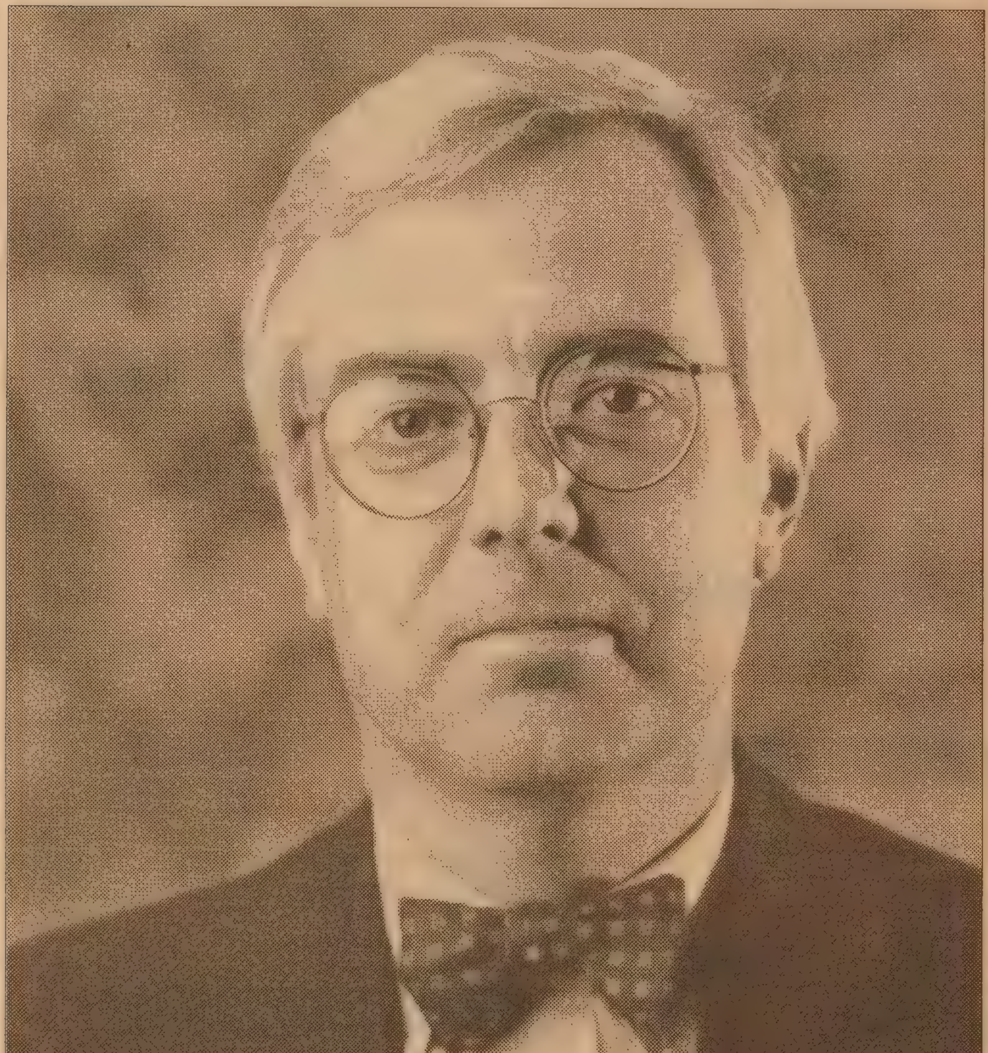


(Inside Fairway Plaza)

Good Times For VCs



Technologic's Dick Shaffer Finds Bullish Venture Industry

By Mary Eisenhart

Scheduled for early December in Burlingame, Technologic Partners' Personal Computer Outlook conference celebrates its tenth anniversary this year, with panels looking into the next decade and the opportunities it presents to the technology investor. The premiere gathering place of venture capitalists and technology entrepreneurs, the conference has served to catalyze the high-tech industry from its inception.

When we checked in with founder and principal Dick Shaffer (interviewed last year in Issue #114), he confirmed reports that venture capitalists are more willing than in recent years to loosen the purse strings. He attributes this in part to a flurry of successful IPOs in the computer industry, suggesting a greater likelihood that VCs will reap attractive returns on their investment. "If it keeps up," he says, "1994 could actually equal or exceed the pace of 1983, which was the largest year for public offerings of technology stocks ever. What that means is that there are more people out there with a lust for red Ferraris who simply think they've got a great business idea, and more venture capitalists who believe them and will finance it.

"These are generally good times for the venture capital industry," he adds. "A number of firms have gotten out of the business; some partnerships have wound down, and some groups have decided not to raise additional money, as their better-known and more experienced partners decide to enjoy life a little more than they have. There are easier ways to make a living than venture capital, and many people have just chosen not to continue.

"That means that there are more, better deals for those who are still in the business."

Do you believe we'll have the problem we had in the '80s—lots of bad me-too deals getting funded?

I think it's almost always the case that we overdo it. It's a cyclical business, sort of a homeostasis process—you overshoot the mark, and then you undershoot it. That's what always happens in markets.

At the moment I think we're still rising slightly, although looking at the quality of some of the public offerings, we seem to be getting into a thinner phase. Institutional investors are being very selective about what they're willing to buy, which means that not every company that wants to go public can do so.

There's a disconnect of a few years between IPO markets and venture capital investment, because there's two to three, sometimes four years after a company's started before it's ready for sale to the public.

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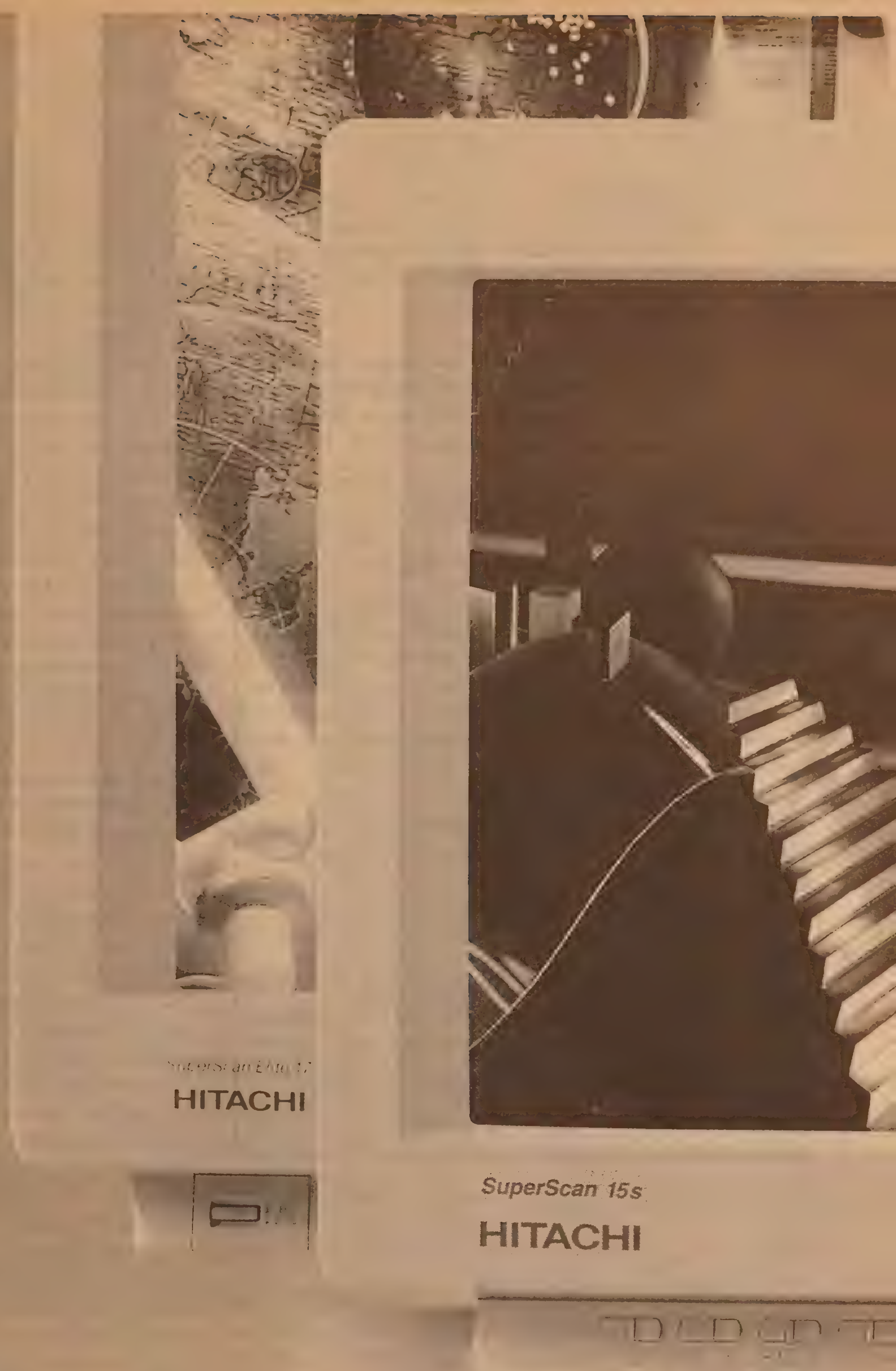

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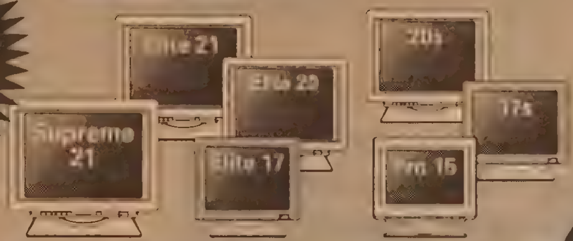

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I've heard more like seven or ten.

They don't like to talk about it, but yes, in fact that's true.

What kind of companies are looking attractive to investors? There seems to be a lot of mobile computing stuff, for instance.

Funding Sources: Search On Your PC

While there are no guarantees in the entrepreneur's world, seekers of funding will often find a valuable asset in Financing Sources Databank, a DOS-based software package from DataMerge (303/320-8361). The software, which also runs on Macs using SoftAT, is an extensive database of funding sources, venture capital among them. There's no substitute for personal contacts and networking, but this software can give the searcher a good place to start.

Users can search listings by a number of criteria—industry, geographical area, type of funding, amount of funding, and type of lender. Multiscreen profiles of matching lenders include detailed information as to the best way to approach the firm, the appropriate contact, the preferred level at which the firm likes to invest, etc.

The database is updated three times a year, and comes in two versions: Entrepreneur features over four thousand financing sources and costs $139; Professional ($499) includes over ten thousand financing sources and also includes mail merge, add/edit, label, and simple report printing functions.

—ME

There's a lot of mobile computing stuff going on, but some of the early companies in that area have found it very rough going. In fact several have gone kaput.

That's the way it is in early industries, especially industries where there's some infrastructure building to be done. If you think back to the early days of the PC, most of those companies are no longer with us. That's the way it is in this wireless area, the mobile area—most of the products out there are not complete solutions to problems.

There's not a large number of people willing to be pioneers and to be their own systems integrators. The market has been slower to take off than I think many people thought it would be. A great many people are convinced it's going to be an enormous market in the not-too-distant future, but the future's not quite here yet.

There's still a fair amount of activity in the mobile market—communications services, communications products of a variety of sorts. Mobility, networking, and consumer are three of the hot growth areas, we feel, for the next many years.

Why is the consumer market real all of a sudden?

There seem now to be machines that can run compelling software, and there are a large number of machines owned by consumers. And depending on whose numbers you believe, somewhere between a quarter and a third of households with children have a PC of some sort. There are an enormous number of titles, thousands, coming out on CDs. Most of them are junk, but a few are good.

What we ought to focus on, and what I think people are beginning to focus on, is the fact that a few are good. Most books are destined for the remainder table. Most records don't go gold, much less platinum; they just sit and gather dust. And so most CDs for the consumer market won't be big hits, but it doesn't cost a lot to turn one out—a million dollars, maybe $500,000. Some can do it for less.

So I think we're at the beginning of content that is really worth having, that in a few cases is actually better than the medium for which it substitutes. That's what you have to have. If a movie was only a recorded play, it wouldn't have amounted to the industry it now does.

The style has to adapt to the new medium.

Exactly. That's beginning to happen. At the moment a lot of the stuff is experimental, style for technology's sake. But we'll get beyond that.

Do you think the Internet explosion is going to have an effect on the venture community?

The venture community has been very slow to get into the Internet area, because it's been hard to figure out how you could make money at that, how you could build a protectable investment. If the network is essentially free, or perceived to be free, and if the connection or the interface—Mosaic, for example—is widely available, how do you build a protectable long-term advantage in that area? Unless you can do that, you don't want to invest any money.

The most **important question** in a venture-financeable deal should be: "How big is **the market** for this? Is it really as big as we think?"

In addition, the Internet culture prides itself on being hostile to commercial ventures, even though it really isn't—it's a different style. I believe that it will evolve to being much more commercialized, but at the moment, venture capitalists, with a few exceptions, have not put a lot of money into the Internet area. I believe UUnet, for example, has some venture capital investment, and Mosaic Communications.

Mosaic's reader has been very well received.

It's a great product. But think how much better that Mosaic has to be than the publicly available Mosaic in order to get peo-

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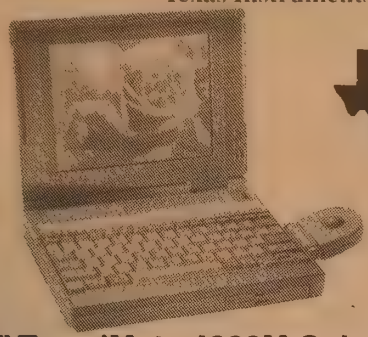

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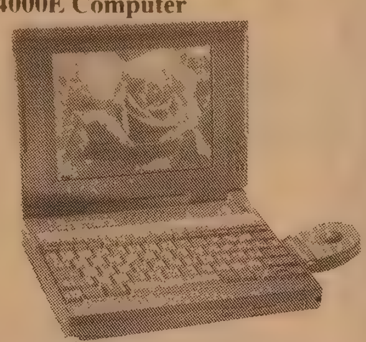

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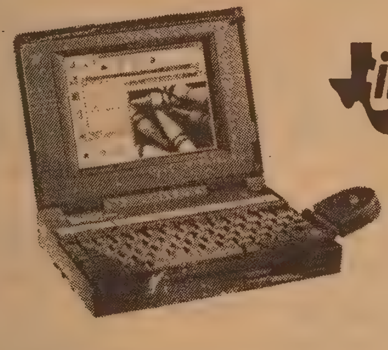

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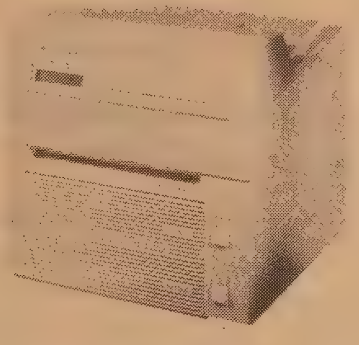

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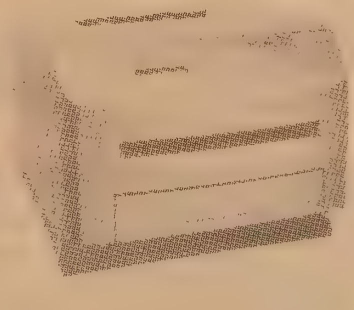

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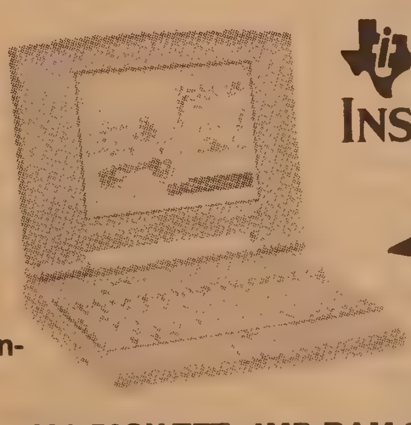

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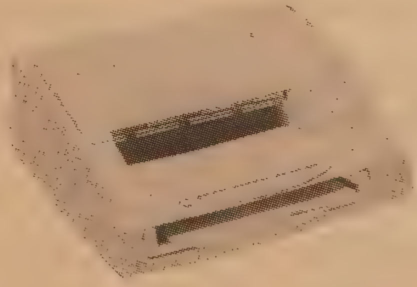

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Good Times For VCs *continued...*

ple to use it, and then you'll have to improve on that to get people to pay for it.

Well, their model seems to be that they're going to give away the client software indefinitely and make money on the server software. But it seems that ultimately the plan is for the money to be made selling content, which is a boon to the crypto industry.

That seems to be the conventional wisdom, and I don't see any fault with it at the moment. If the most money is to be made in selling content, that's typically not a venture-financed business. Content is typically financed through limited partnerships or through loans.

On the other hand, you see companies like Paramount starting their own VC firms.

They are starting their own venture funds, and they are financing a few things like Paramount Technologies, but if the content business bears any resemblance to print media, broadcast media, film, and theater, all of which are well-established predecessors, it won't be venture-financed. Theater, for example, is financed typically through limited partnerships. And so is film, or film is financed through production agreements—the distributor lends the money to the producer in exchange for the right to distribute the film.

It's a perfectly viable way to do it, it just isn't venture capital.

How much interest do you see from VCs on things that are farther out on the horizon, like some of the more advanced biotech things, and nanotechnology?

I see interest, but almost no investment.

There is biotechnology investing by some of the same firms that invest in information sciences, but not the same people, generally. At Kleiner Perkins, for example, John Doerr sort of shepherds the information science projects, whereas it's Brook Byers who does the life science projects.

Doerr and I had a conversation a few years ago about *Engines of Creation*, and some of the other nanotechnology books. It's an incredibly interesting area, but I don't see much investment in that field yet.

It seems quite far from commercialization as a product. There's some micromachining going on in the area of sensors, and in sensor applications it makes a lot of sense. But for one thing, sensors are not a very sexy business, and they're not a very big business. Unless micromachines and nanotechnology get beyond that into some of the more fantastic applications that have been envisioned, it's just not going to attract the kind of capital that comes when presented with huge opportunity.

Also it's a longer-term investment than most VCs are comfortable with.

Venture capitalists expect to have a product within a year or two. Finished and on the market. They need to know that the technology will work.

The most important question in a venture-financeable deal should be: "How big is the market for this? Is it really as big as we think?" And maybe the next most important question is: "Can this team really reach that market at a profitable cost?" We're years from knowing that about nanotechnology. (Technologic Partners, 212/696-9330.) ■

Continued on page 320

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MediaVision Jazz 16 (AT/SCSI)	$92
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MediaVision Pro Audio Spectrum 16	$76
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Fax Modem (28.8 Data, 14.4 Fax)Ext.	$158
Pocket Fax Modem (9648/24)	$76
Pocket Fax Modem (14,400/14,400)	$174
Hayes 14400 Fax Modem Int/Ext	$118/138
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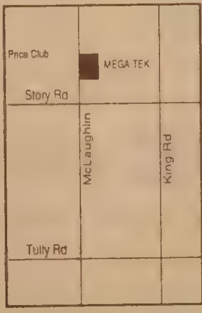

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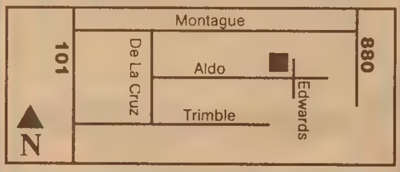

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- **NEC 1.2 & 1.44 Drives**
- **15"** Non-Interlaced .28 (GREEN PC) **(1280x1024)**
- **WD 540MB** 12MS IDE Hard Drive
- **Fujitsu** 101 Enhanced Keyboard
- Ultra Medium Tower Case w/ **250W (UL)** Power Supply

NEW 64-BIT Graphics 2MB

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Green Python IV	486DX4-100 (Intel)	$1898
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Green Python III	486DX2-66 (Intel)	$1498

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- **8MB** RAM Installed **High Speed 60NS**
- NEC 1.44 Drive
- **540MB** 12MS IDE Hard Drive
- **PCI IDE** Hard Drive Controller
- **GREEN PYTHON™** PCI S3-64 Screaming 64 Bit Graphics Accelerator w/**2MB** RAM, True 16 Million Colors
- **15"** Non-interlaced .28 (GREEN) **(1280x1024)**
- 101 Enhanced Keyboard
- DELUXE Medium Tower w/ UL 230W Power Supply

NEW Screaming 64-BIT PCI Graphics 2MB

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Action PCI III	486DX2-66	$1498

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ACTION P5 SERIES

- PCI 586 Pentium Motherboard
- Intel Pentium 586 Processor
- **256K** Cache
- **8MB** RAM Installed **High Speed 60NS**
- NEC 1.44 Drive
- **540MB** 11MS IDE Hard Drive
- **PCI IDE** Controller
- **GREEN PYTHON™** PCI S3-64 Screaming 64 Bit Graphics Accelerator w/ **2MB** RAM, True 16 Million Colors
- **15"** Non-interlaced .28 (GREEN) **(1280x1024)**
- 101 Enhanced Keyboard
- DELUXE Medium Tower w/ **UL 230W** Power Supply

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ACTION G P5 SUPER 9

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- AMI Flash Bios
- 4 PCI BUS Master, 2 VESA Slots
- Intel Pentium 586 90MHz Processor
- **512K** Fast Cache
- **8MB** RAM Installed **High Speed 60NS**
- NEC 1.44 Drive
- **540MB** 12ms IDE Hard Drive
- **PCI IDE** Controller
- **GREEN PYTHON™** PCI S3 Screaming 64 Bit Graphics Accelerator **w/ 2MB RAM**, True 16 Million Colors
- **15"** Non-Interlaced .28 (Edge to Edge) **(1280x1024)**
- 101 Enhanced Keyboard
- Deluxe Full Tower Case w/ **250W (UL)** Power Supply

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- ZIF SOCKET (zero insertion force)
- **256K** Fast Cache Upgradable to 1MB
- Support 72pin Modules in Multiple Configuration for Flexible and Economical Upgrade
- **8MB** RAM **Ultra Fast 60NS** 72pin Module Expandable to 128 MB
- New **GREEN PYTHON™** GUI Engine 5434 Screaming 64 Bit Graphics Accelerator w**2MB** RAM, 16 Million True Colors
- Super VL-BUS Ultra Fast IDE w/2S, 1P, 1G Port (Hi-Speed Serials)
- **NEC 1.2 & 1.44 Drives**
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- **WD 700MB** IDE Hard Drive
- **Fujitsu** 101 Enhanced Keyboard
- DELUXE Full Tower Case w/ **250W (UL)** Power Supply

NEW 64 Bit Graphics 2MB

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- Original **Sound Blaster** (Stereo) Sound Card
- **TEAC** Super Fast ***QUAD 4X*** Speed CD ROM Drive (195ms, 600KB/sec.)
- Photo CD, Multisession Compliant
- Super Power 80W Stereo Speakers
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Plus Popular Encyclopedia CD Titles 14

Model	CPU	Price
M2 Advanced IV	486DX4-100 (Intel)	$2708
M2 Advanced III	486DX2-66 (Intel)	$2388

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Item	Price
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Sound Blaster MCD 16 (stereo) OEM Package Limited Quantities Only	$88
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NEC 3x speed 190ms 450KB	$298
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5/10 User	$588/1348
25/50 User	$1898/2688
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17" Non-Interlaced, .28dpi (1280)	$578
14" Non-Interlaced, .28dpi	$218
17" KFC Flat Screen .26	$629

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Item	Price
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HP DeskJet 560c	$548

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Item	Price
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Deluxe Mid Tower w/230W PS	$48
Deluxe Full Tower w/230W PS	$68

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Item	Price
Fujitsu 101 Keyboard	$36
Focu 2001 Keyboard	$36
Maxi Switch 101 Keyboard	$26

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Item	Price
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Digicom 19.2 Fax + Modem + Voice INT w/Terbo	$99
Digicom 28.8 Fax + Modem INT	$159

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Item	Price
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Western Digital 540MB IDE 12ms	$259
Western Digital 700MB IDE	$349

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Item	Price
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GREEN: Support Power Management (GreenPC)
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- AMI Flash Bios
- 4 PCI BUS Master, 2 VESA Slots
- Intel Pentium 586 90MHz Processor
- **512K Cache**
- **8MB** RAM Installed **High Speed 60NS**
- NEC 1.44 Drive
- **540MB** 12MS IDE Hard Drive
- **PCI IDE** Controller
- **Green Python™** PCI S3Screaming 64Bit Graphics Accelerator **w/ 2MB RAM**, True 16 Million Colors
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- 101 Enhanced Keyboard
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- **Mitsumi** Fast Double Speed CD-ROM Drive (250ms, 350 KB)
- MPC, Photo CD Multisession Compliant
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- **Microsoft Mouse & Mouse Pad**

Plus Popular Encyclopedia CD Titles 14

Model	CPU	Price
Action P5 Super 9 Multimedia	PENTIUM 90	$2578

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- **GREEN PYTHON™** 486 Advanced Mainboard
- EPA "ENERGY-STAR" Power Management **(GREEN PC)**
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- Intel 486 Processor
- ZIF SOCKET (zero insertion force)
- **256K** Fast Cache Upgradable to 1MB
- Support 72pin Modules in Multiple Configuration for Flexible and Economical Upgrade
- **8MB RAM** Ultra Fast **60NS** 72pin Module Expandable to 128 MB
- New **GREEN PYTHON™** GUI Engine 5434 Screaming 64 Bit Graphics Accelerator w/ **2MB RAM**, 16 Million True Colors
- Super VL-Bus Ultra Fast IDE w/ 2S, 1P, 1G Port
- **NEC 1.2 & 1.44 Drives**
- **15"** Non-interlaced .28 (GREEN) **(1280x1024)**
- **WD 540MB** 12MS IDE Hard Drive
- **Fujitsu** 101 Enhanced Keyboard
- Ultra Medium Tower Case **w/ 250W (UL)** Power Supply

NEW Screaming 64-BIT Graphics 2MB

M2 PRO PACKAGE:

- Original **Sound Blaster** 16 MCD (Stereo) Sound Card
- **Mitsumi** Fast Double Speed CD ROM Drive (250MS, 350KB)
- Photo CD, Multisession Compliant
- Super Power 80W Stereo Speakers
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Plus Popular Encyclopedia CD Titles 14

Model	CPU	Price
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M2 PRO IVA	486DX2-80 (AMD)*	$1998
M2 PRO III	486DX2-66 (Intel)	$1888

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- ATI Graphic Accelerator PCI 1MB
- 101 Keytronic Keyboard
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300KB/sec Data Transfer Photo CD Compatible, Double Speed	**$120**
SONY 55E	
250ms, 300KB/sec Data Transfer Photo CD Compatible, Double Speed...	**$125**
MITSUMI	
250ms, 300KB/sec Data Transfer Photo CD Compatible, Double Speed	**$120**
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CHINON CD 535 (2X-SCSI)	
256K Cache + 64K Buffer Photo CD Compatible, Caddy	**Call/$320ext**
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200ms, 330KB/sec Data Transfer, 256K Cache Photo CD Compatible, Caddy	**$240int/$340ext**
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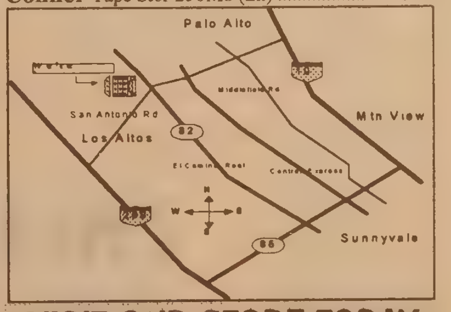

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Improving Your Relationship With System 7.5

Plus: Court Dismisses "Butt-Head Astronomer" Suit Against Apple

By David Morgenstern

I'm braving it out upstairs, sharing a byte of family time, with eyes glued to the tubes. My wife and daughter are following the exploits of the *Beverly Hills 90210* characters, while I'm working my way through the text characters displayed on my computer screen.

Actually, its like the parallel play that babies do when placed next to each other. They play by themselves, but do it side by side. I'm working on a PowerBook 100, while we're all being bathed in the glow of evening soap opera antics.

Fortunately, the weekly machinations of fashion models, not-so-collegiate students, and twenty-something advertising executives cannot interfere with the delivery of BMUG tips. This month we've got tips galore, some solid-gold essentials and others covering the new System 7.5 operating system.

Tip Off The Old Blockhead

As mentioned in last month's column, System 7.5 has some interesting and powerful features. If you have installed it, here's a bundle of tips that will save you a byte of time and some headaches. If you are looking at installing the new systemware, then you're forewarned and can show off to the office crowd.

- One of the not-so-great new features of System 7.5 is the Shut Down desk accessory. For some reason, Apple's usability studies seemed to show that the regular

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Shut Down item in the Special menu is too tough for most users. So they added another way to turn off the Mac.

Unfortunately, there are some problems with this shortcut. The first is that it is very easy to select it by mistake. I've hit it by accident when selecting another item in the menu. If you're lucky, you will have a document open that needs saving, so you can cancel the shutdown process.

System 7.5 takes a significantly longer time than previous systems to boot up, and turning the Mac on and off again can take minutes. The new longer startup routine now sports a status indicator bar, reportedly since users became worried that something was wrong when it took so long.

Even worse, the new desk accessory bypasses any items in the Shut Down Items folder during shutdown! If you're using this folder (found in the System folder) and expecting some synchronization or backup application, or AppleScript droplet to run upon shutdown, you will be doubly sorry. Just toss this loser DA into the Trash and forget it.

• System 7.5 adds a feature that I hear comes from the Performa operating system that gives you a boot-time Shut Down warning if you didn't properly use the Shut Down DA or Special menu command. This is not a bad thing, since new users sometimes just turn off the entire computer system from a switch on a power strip.

Bypassing the proper shutdown procedure is a naughty thing to do with Macs and peripherals. The Mac has a number of internal housekeeping tasks to perform at shutdown time, and some inkjet printers will leak ink when the computer is turned off if their nozzles aren't capped, which automatically occurs only when you hit the On/Off switch on the printer.

But this warning alert at startup also kicks in if you crash, which is sometimes more often than not. Fortunately, it can be turned off in the General Controls control panel.

• System 7.5 has really improved the way the Mac copies files. In previous systems, you were totally locked out of using your Mac when copying or moving files. This is especially frustrating when working on a network, where it's easy to copy many large files, and equally time consuming.

The new system lets you move the cursor over to the right-hand-side application menu and work on an open document in an application. But you must make sure that the documents and applications you need are already open, since the copying routine doesn't let you launch a program or use the desktop during the operation.

• Another addition from the Performa systems is an option to hide the Finder when working in applications. More accurately, it's the Show Desktop when in background checkbox in the General Controls control panel. This option prevents users from switching out of an application

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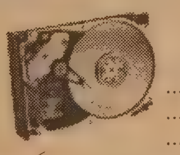

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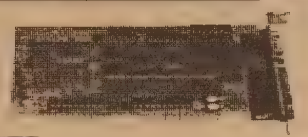

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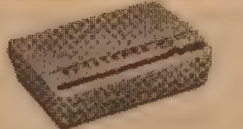

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Monterey	14
101 Keyboard	12
Microsoft Mouse	24
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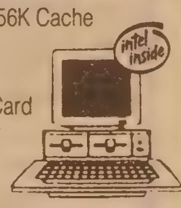
3-Button Microsoft Compatible	7

486DX/66MHZ



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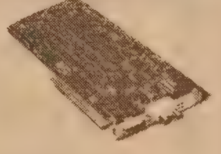

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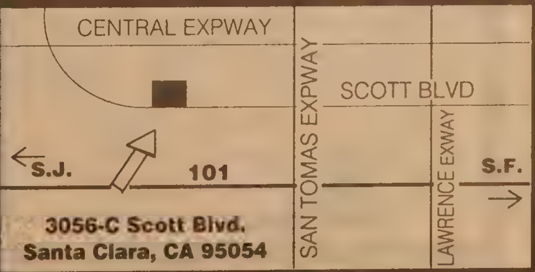

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by accidentally clicking on the desktop.

It's meant for some new users who might be confused by suddenly switching to the Finder from their word processor or multimodule Works program, but it's also especially useful for people with fine motor control difficulties who might hit the desktop when aiming for a document scroll bar.

- Don't be alarmed if the new System 7.5 "universal" Disk Tools disk appears to run slower than earlier flavors—this is a feature. It seems that there are more compressed resources than found on other Tools disks, which take additional time to decompress.

The Past, Present, And Future Tip

The parade of tips continues, with the focus on golden memories—RAM and hard disk memory, especially:

- Many users view their system windows only by Name or Date. This is a fine thing to do, but unlike the Icon and Small Icon views, these other views do not inform you about how much room remains on your hard drive. Sometimes the memory available on the drive can run down to less than a single megabyte. This is not a good thing!

Your Mac needs a certain amount of free hard disk space to keep working properly, over and above the virtual memory that can be set under System 7. Additionally, there are temporary files that are written by applications, and expanded disk memory requirements when printing with the LaserWriter 8 driver. It's important to keep at least a few megabytes free when working, so that you don't send your data roadways into gridlock.

- Users can also come to grief with the application memory setting found in each program's Get Info box. There are three "Memory Requirements" listings in the box: Suggested Size, Minimum Size, and Preferred Size.

The Suggested Size is the amount of RAM that the developer says will let the program run properly. This may or may not be correct for your needs, especially if you frequently open lots of documents or large files.

If you are always getting memory alert dialog boxes when working in your important applications, then you should increase the settings of the Preferred Size. This is the actual level of memory that the application will request at launch time. This will let you work without interruption from the annoying alerts.

The Minimum Size is the smallest amount of RAM that you can squeeze the program into. This may not be enough to actually get much work done, since this level may only support very small files, or only let you do certain kinds of operations with the program. If you want to make sure that you can actually do the things you need to with your programs, then boost the Minimum setting to at least the Suggested level, if not the Preferred.

- One of the benefits of user group membership, BMUG as well as other groups, is the ability to take advantage of discounts offered to members by hardware and software vendors.

Apple, through its User Group Connection, has been offering discounts on discontinued or refurbished models. There are limits to the number of machines being offered (dumped) and the flavors are very specific. Also the financial arrangements are made directly with the Connection and not through the group itself.

Recent models included a MacTV, the all-in-one Mac with CD-ROM and built-in TV tuner for around $775 and a PowerBook Duo 270C 4/240 for only $1449. This isn't bad for people looking for a second Mac or a machine for the kids. New deals come down the road every now and again.

- Five years ago this month, the BMUG column reported on BMUG's efforts to help with the Great Quake of '89, new nVIR virus outbreaks, printing problems, and the highlights of the Seybold and World Computer Congress exhibitions.

One of the tips included the report on a booth of a safe company. They showed several models of data storage safes that can keep floppies and paper data intact through a building-destroying fire.

The heat of a fire can be so intense that the shell of the safe can be totally burned and fused. I was told that sometimes the safe can even fall stories when the floors give way. But the data inside the safe is not ruined.

Some models look like standard office two-drawer paper files, while others are more traditional-looking safes. They are much different in construction from ordinary money safes, which may keep the contents safe from thieves, but not from the heat of a fire.

Business owners may think they are getting a bargain by picking up a safe at a flea market or from the want ads, but it's really a pig in a poke. They think that a safe is a safe, against both theft and fire. Not so!

A recent survey showed that more than half of small businesses could not survive the loss of their business records—by natural disaster, or by hard disk crashes. It's no good to be diligent in backing up your important business records without some provision for off-site backup.

The same principle holds for us everyday folks. If you have been good and backed everything up in the house, make a copy and put it in a safe place, but away from home. Perhaps at the office, or at the next door neighbor's. The idea is not to be driven insane with security concerns, but to try and do something to avoid the total loss of your important data files.

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continued on page 322

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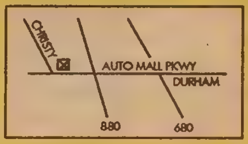

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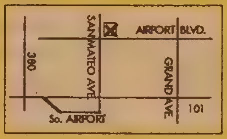

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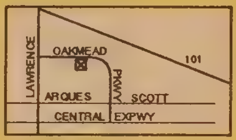

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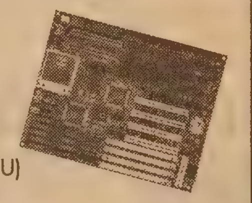

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BIOS	AMI	AMI (Flash BIOS Optional)	AMI (Flash BIOS Optional)	AWARD (Flash BIOS Optional)	AMI (Flash BIOS Optional)
Energy Saving	NO	NO	YES	YES	YES
Processors (SX/DX/DX2)	All Intel/AMD Cyrix (M7 series)	All Intel/AMD Cyrix (M7 series)	All Intel/AMD Cyrix (M7 series)	All Intel/AMD Cyrix (M7 series) **INTEL DX4-100** AMD DX2-80	**INTEL Pentium** **P5-90MHz** **P5-100MHz**
Max. Memory	128MB (30 pins)	128MB (30 pins)	128MB (30 pins)	128MB **(72 pins)**	128MB **(72 pins)**
Max. Cache	256K	256K	1MB	1MB	512K
Expansion Slots	2 VESA BUS 6-16 bits ISA BUS	2 VESA BUS 6-16 bits ISA BUS	2 VESA BUS 5-16 bits ISA BUS	3 PCI BUS 1 PCI/ISA BUS 4-16 bits ISA BUS 2 VESA BUS	4 PCI BUS 2 VESA BUS 5-16 bits ISA BUS
CPU Socket	Standard	Ziff (overdrive)	Ziff (overdrive)	Ziff (overdrive)	Ziff (overdrive)
Bus Master	2 Slots	2 Slots	3 Slots	6 Slots	4 Slots
Dimension	8.7" X11"	8.7" X11"	8.7" X11"	8.7" X11"	8.7" X13"
Sale Price	**$118** (w/256K)	**$128** (w/256K)	**$138** (w/256K)	**$165** (w/256K)	**$275** (w/256K)

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- Mid Case w/PS
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- DX4-100 MHz CPU
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- PCI Enhanced IDE Interface
- PCI Local Bus Graphics w/1MB
- Double Speed CD-ROM, 16 Bit Sound Card & Speakers
- 14.4K Fax Modem
- 3.5" Diskette Drive Teac
- 15" Color SVGA Monitor NI
- Mid Case w/PS
- 101 Key Keyboard & Mouse
- MS-DOS 6.22 & WIN 3.11

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P5-90 FAMILY PC

- 90MHz Pentium CPU
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- Double Speed CD-ROM
- 16 Bit Sound Card & Altec Speakers
- 14.4K Fax Modem
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- 15" Color SVGA Monitor NI
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- Local Bus Graphics w/1MB
- Double Speed CD-ROM
- 3.5" Diskette Drive Teac
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P5-60

- 60MHz Pentium CPU
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- 8MB RAM, 256KB Cache
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- PCI Enhanced IDE Interface
- PCI Local Bus Graphics w/1MB
- Double Speed CD-ROM
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- 101-Key Keyboard & Mouse
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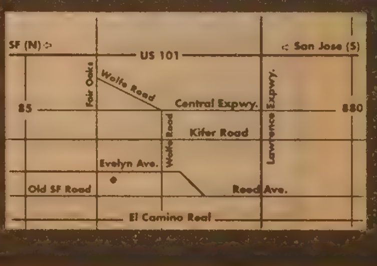

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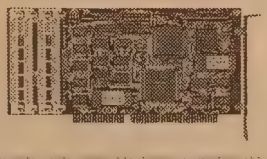

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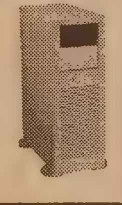

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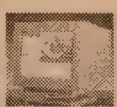

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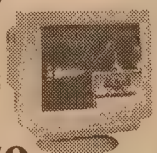

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ViewSonic-17G 1280x1024	$765

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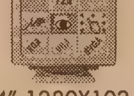

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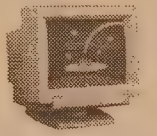

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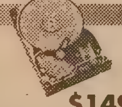

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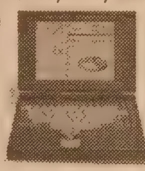

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486SX-33	1355	1899	2899
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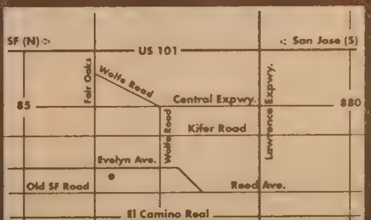

Online And Wireless:

Netnews Via Satellite

BY JACK POWERS

Imagine getting an electronic newspaper thousands of pages in size, one that's updated continuously and isn't really on paper. The publisher is nowhere to be found—the whole thing is a group effort by people all over the world who work for free.

This is Usenet News, a.k.a. netnews. Today, there are several thousand topics under discussion, and the list grows longer every day. For people who are information junkies, reading and responding to netnews can be addictive, gobbling immense amounts of time. Others are satisfied with "skimming the cream" of material matching a few specialized interests.

For most, participating in netnews (a large fraction of readers are also contributors) means using a terminal or a personal computer somehow connected to a shared computer system, like those at a university or public-access UNIX service. Your netnews connection could be a commercial service like America Online, or a participating BBS. You don't join in the flow directly (that would be like drinking from a fire hose), you use the shared system as an information agent to show you the stuff you care about.

The economics of this arrangement are that a large number of users can share the cost of the shared system, resulting in a small cost per user. Storage is a big part of this cost, with over 1GB (1000MB, or the equivalent of 714 floppies) of text broadcast every one to two weeks. System operators deal with this quantity by limiting the number of newsgroups they carry and/or deleting material older than a few days (one week is a common compromise).

Much of the growth of the news network in recent years is from BBS operators, anxious to add material to attract new users (see the BBS listings in this publication.)

Delivery: Bypassing The Clogged Pipeline

Netnews has been traditionally sent between these shared "site" computers via dial-up calls—which are getting longer and longer as volume increases. More recently, it has also been distributed via Internet connections. The total flow is approaching an average of 100MB per day, more information than will fit on the disk drive of many laptop machines. A typical day's traffic is several times what can be transmitted with a slow modem in twenty-four hours. Often, sysops are forced (usually reluctantly, because censorship isn't popular) to pick and choose groups, just to avoid getting more and more behind.

Slightly over a year ago, Pagesat, a company in Palo Alto, introduced a combination of product and service which delivers netnews to site computers via satellite. Aimed at BBS operators and serious individual netnews consumers, it is simple and inexpensive enough to allow the delivery of netnews with very little delay to private or shared computers for which it would be impractical via more traditional routes.

Before satellite delivery, systems offering netnews had to get it either by phone from

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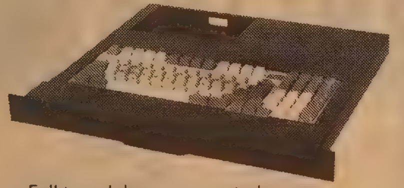

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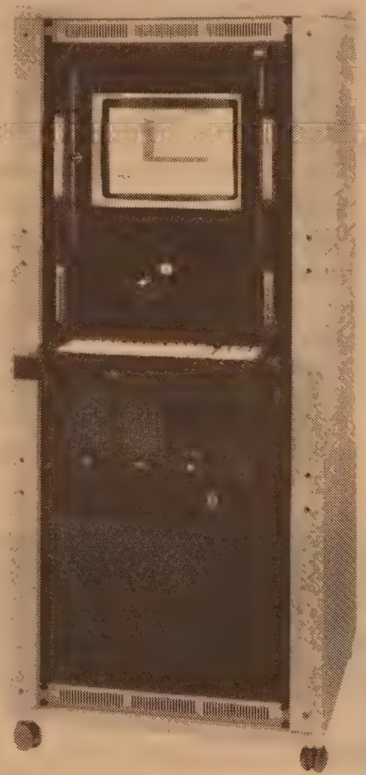

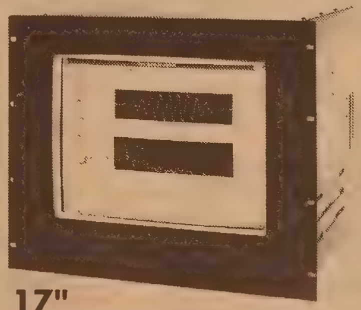

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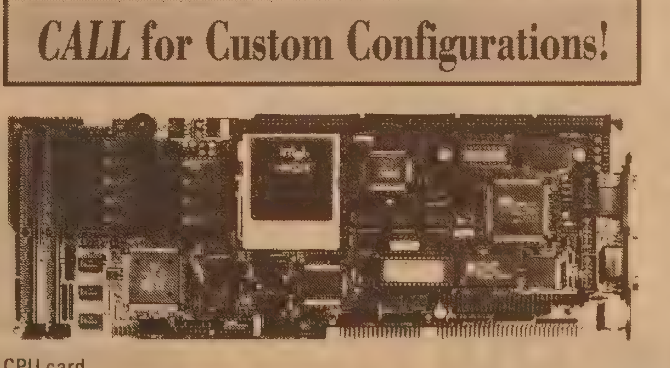
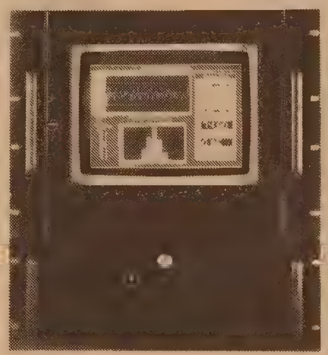


RACKMOUNT SYSTEMS



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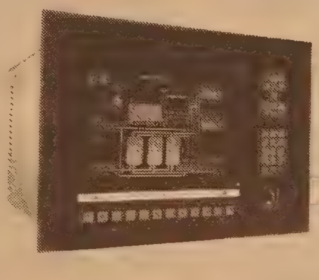

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- Rack/Panel-mount chassis
- 9", 10", or 14" Mono or Color Monitor
- 7 or 8 Expansion slots

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Photo: Lynn Wheeler and Dish

another site or via a direct Internet connection. The phone technique works great for sites within local calling distance of each other, using fast modems. The Internet technique is even better, but direct Internet connections are still relatively rare. For systems beyond a local call and lacking Internet, offering netnews can get very expensive very fast.

With the Pagesat system, you buy the receiving hardware and pay a fixed monthly charge to receive netnews twenty-four hours a day every day. The first year's monthly charges are included in the price of the receiver, which has been as low as $695 on sale. After that, it costs $30/month.

How It Works

Pagesat brings multiple Internet news feeds into Sun Microsystems computers at its Palo Alto headquarters, where it is assembled for satellite uplink at a dish farm in Mountain View. The system is designed to keep running in spite of hardware and link failures, even in combination.

A satellite called "K2," over 22,000 miles above the equator, relays the Ku-band signal back to the continental US and parts of southern Canada and northern Mexico. Over most of this area, only a very small receiving antenna is required; areas with much rain or snow may require a larger dish (up to 3') for reliable reception.

The receiver spits out an almost endless stream of text into the serial port of your computer. The data is regular ASCII, so you can watch it using a communications program like ProComm, but it flies by too fast to read—in order to grab and store the news you want, you'll need software designed for the purpose. Software packages are available for IBM PC-compatible (DOS or Windows) and UNIX systems. So far, Mac users are out of luck, but an old PC (only a 286 is required) can be had pretty cheaply these days.

The UNIX software support is supplied in "C" source form, and requires development tools for installation. Since details vary from one system to another, some adaptation may be required.

The System

The Pagesat system comes in three parts: dish, receiver, and power supply. Almost anyone can install it if directions are followed; it is much simpler (and smaller) than systems used for TV. Since the dish doesn't need to move after installation, there are no moving parts to get out of adjustment or fail.

A small (24.8" in diameter for most locations) receive-only dish mounts outdoors and a receiver that looks like a modem (which, among other things, it is) goes inside. The dish connects to the receiver with the same kind of coaxial cable used for TV, and the receiver

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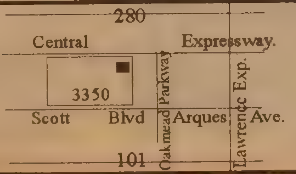

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connects to your computer with a regular modem cable. Power is supplied with a plug-in "wall cube" supply; that's all there is to the hardware.

Mounting the dish requires only ordinary hand tools and a convenient wall or post; aiming it requires you to follow simple instructions for using a compass to find the approximate point in the sky and listening for a tone in the receiver's speaker. Once you have "found" the tone, you adjust the vertical and horizontal angles for the loudest sound from the speaker, then tighten the nuts. Unless you have to dig a hole for a post, you can have the dish working in half an hour. (If I can do it, anyone can!)

This system is a boon to individuals and BBS operators for whom telephone calls to the nearest news feed are not practical. It is cheap enough that even well-connected systems could use it as a backup in case their regular news feed goes belly-up.

Note that this is a receive-only system; clearly, if it were the only game in town, there wouldn't be any news for anyone to read! In order to post news articles or to follow-up or reply to news you read, you'll still need to call a site with two-way connectivity. Since most people read much, much more news than they write, this isn't much of a burden.

User Satisfaction

A friend, Lynn Wheeler, and I have been receiving netnews for almost two years using two generations of Pagesat hardware. The first-generation system performed well, but reception sometimes faded in wet weather. The current product, with a 24" dish, provides much more signal margin for bad weather and has been rock-solid.

We picked a Bay Area business from Pagesat's customer list and asked the system operator how the Pagesat receiver was being used and how it performed. Daryl Jones of Telecomm Engineering in South San Francisco reported that he operates a UNIX service for his clients and that he used it as one of two news sources. "It certainly meets my needs, and it is a full feed—I'm not missing anything," he said. He was also happy with the way Pagesat upgraded his receiver at no charge and exchanged his dish for a larger one at a favorable price.

Jim Brennan, sysop for the Kingmont Astrophysical Observatory BBS in Loomis, CA, is another satisfied customer. He bought a Pagesat system to avoid the 35-mile netnews toll calls to Sacramento that were costing him as much as $400/month. He told us that after some early software problems (it worked, but not the way he wanted it to with his Wildcat BBS), he moved it to a Linux system where it is operating "flawlessly" now.

Pagesat is not without critics. Ironically, the most visible criticism is in a netnews group called biz.pagesat, where customer reports vary. One user claimed that aiming the dish was so difficult that he paid a satellite TV installer to do it for him. (Brennan, however, says that it took him five minutes to aim his.) Others have reported delays in transmission which could have been caused at Pagesat or elsewhere. A number of early users have upgraded to a larger dish for more signal fade margin.

Our experience with the system has been good, but your mileage may vary. An unobstructed view of the satellite is required, and the "offset feed" dish makes it appear to be looking higher in the sky than it is, so that hills or trees may be more significant obstacles than they appear to be. Software may not do what exactly you need or fit your operating environment without some work...check before you buy.

Bottom Line

Besides being fun to install and use, the Pagesat satellite netnews receiver system is an economical alternative to toll calls for data reception. Installing it requires some amount of technical fortitude and skill (more of the former than the latter), and it won't work in places where there isn't a clear shot at satellite K2. Some software tinkering may be required to configure the supplied programs to your environment, so ask lots of questions before you buy. ■

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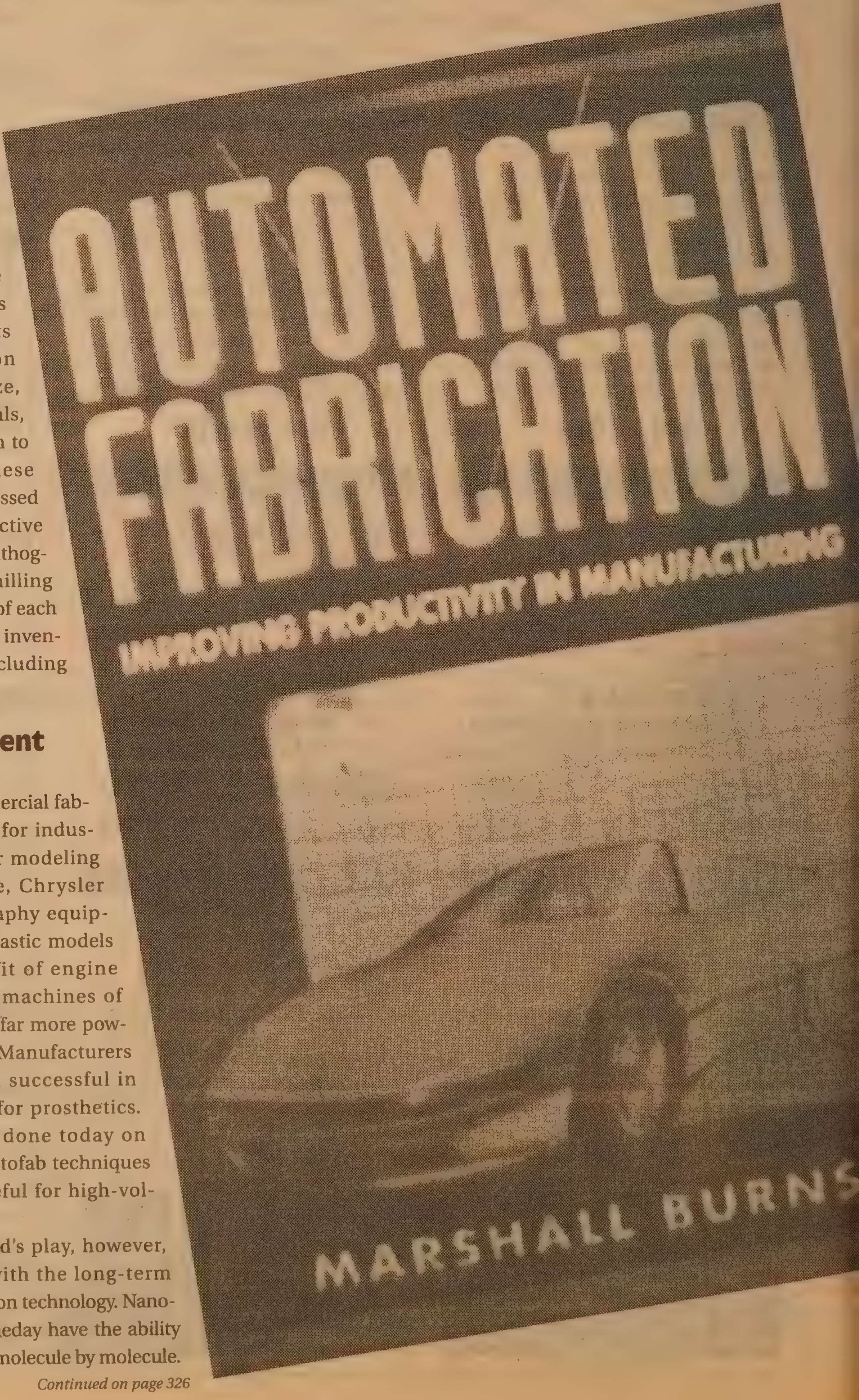
Automated Fabrication:
THE FUTURE OF MANUFACTURING?

Book By LA Author Explains Emerging Technology

By Todd Kaloudis



Welcome to the age of automated fabrication ("Autofab"), the computer-controlled generation of three-dimensional structures:

A photo polymer is an organic resin that solidifies (cures) under the influence of light. Photo polymer-based fabricators work by laying down a thin layer of resin and shining the proper wavelength of light on it in a pattern that describes the 2-dimensional shape of a single cross-section. [Then] a new layer of resin is applied and the process is completed. The previously formed layers recede to a greater depth in the resin vat. The final result, after the last layer is formed, is a solid object.

One thing that is particularly appealing, even astounding [about a particular method] is its ability to build composite mechanical structures with integrated moving parts—with no assembly [required].

—from Automated Fabrication, *by Marshall Burns*

In *Automated Fabrication*, the first book to present Autofab as a unified subject, Marshall Burns, a Ph.D. in physics, does a fantastic job of introducing and discussing this emerging group of technologies.

Automated Fabrication is divided into many sections with an assortment of topics. Primarily writing for managers and engineers in manufacturing, Dr. Burns covers the essential issues of surveying, purchasing, and using Autofab equipment. In addition, many chapters are dedicated to application of the technology and its impact on people.

Various types of additive and subtractive fabrication are compared for different applications. The latter process starts with a block of material and sculpts it to the desired specification. The former is more mysterious—as outlined in the introductory passage above, tiny bits of material are automatically assembled from scratch.

Individual subtractive and additive fabricator products are reviewed. Charts and tables focus on price, machine size, consumable materials, and general approach to fabrication. These approaches are discussed in detail—from selective sintering and stereo lithography to five-axis milling machines. The story of each unique product and invention is also told, including patent history.

Autofab, Current And Future

While current commercial fabricators are mainly for industrial prototyping or modeling tasks (for example, Chrysler uses stereo lithography equipment to generate plastic models for checking the fit of engine components), the machines of the future will have far more powerful applications. Manufacturers have already been successful in fabricating molds for prosthetics. Research is being done today on applying current Autofab techniques to steel molds, useful for high-volume production.

Even this is child's play, however, when compared with the long-term potential of fabrication technology. Nanofabricators may someday have the ability to assemble objects molecule by molecule.

Continued on page 326

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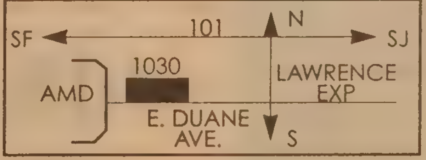

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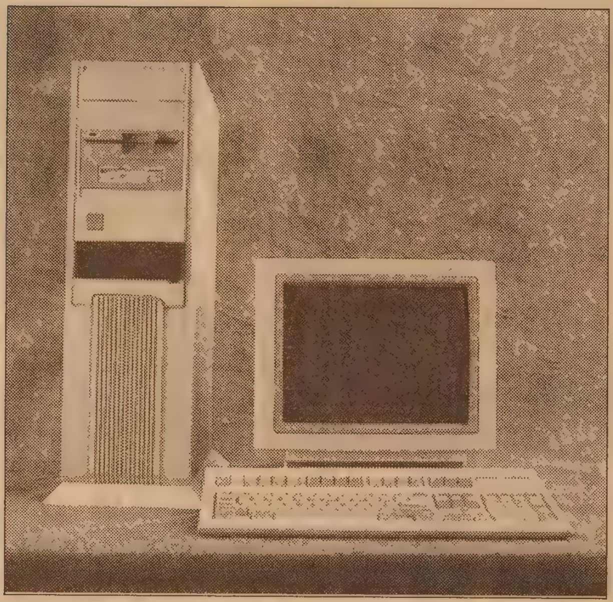

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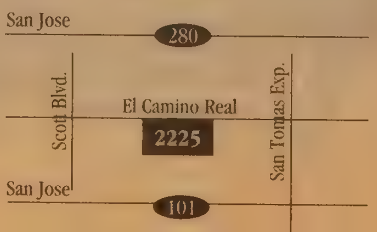

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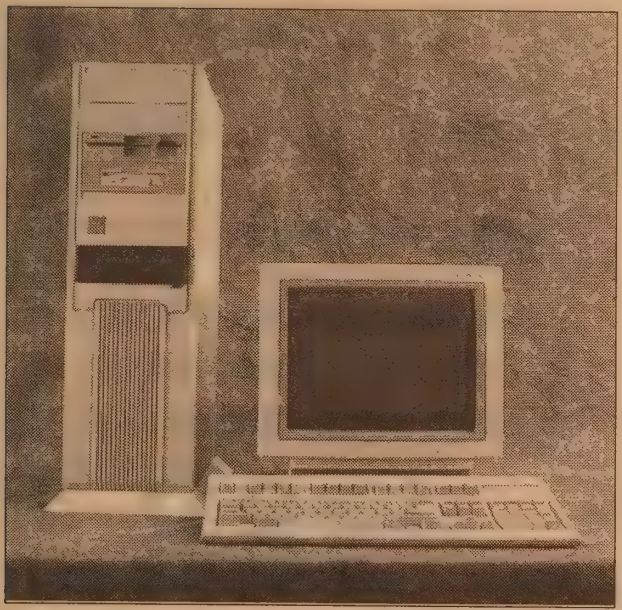

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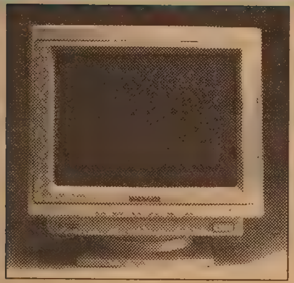

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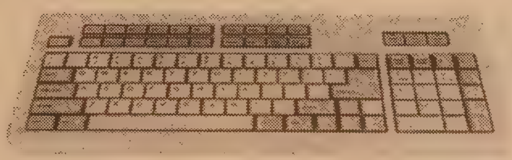

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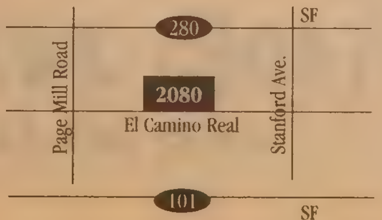

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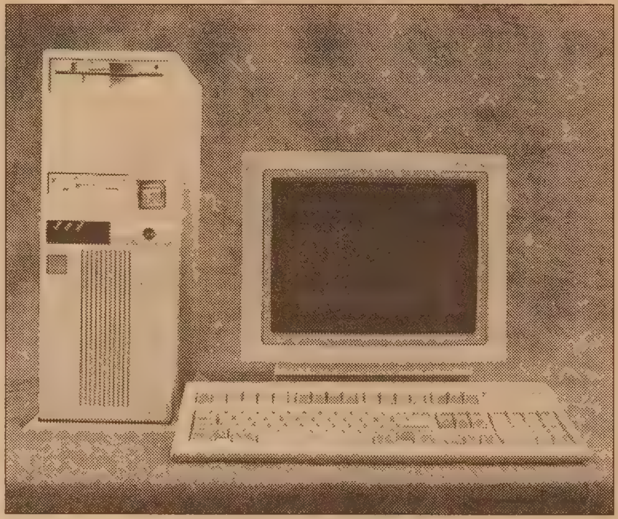

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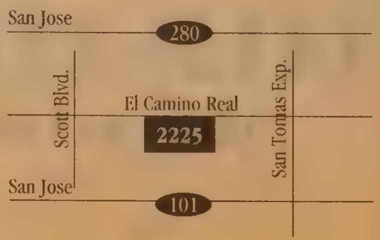

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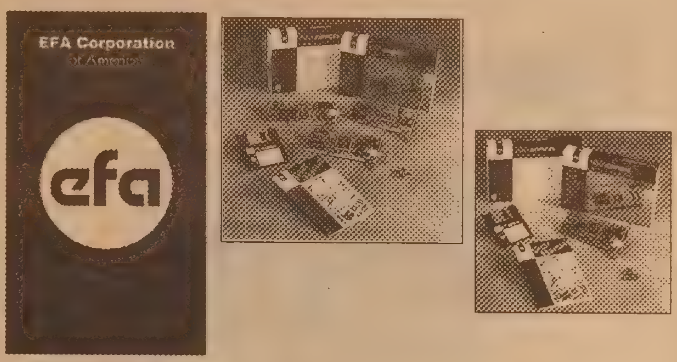

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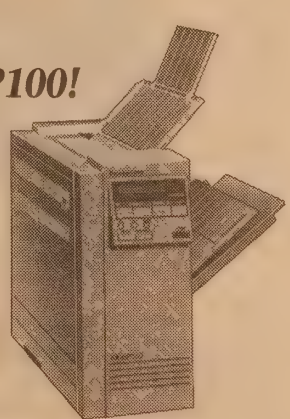

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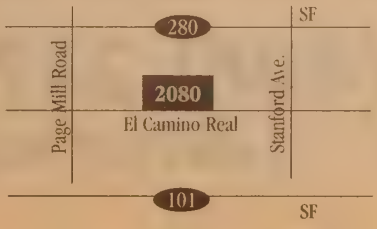

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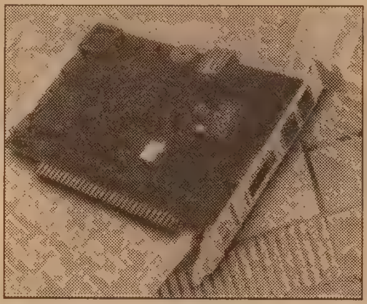

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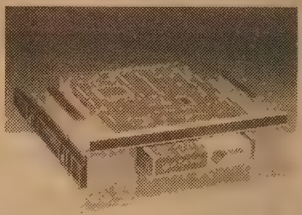

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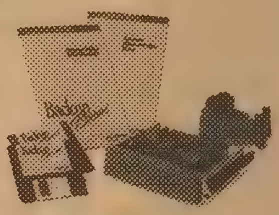

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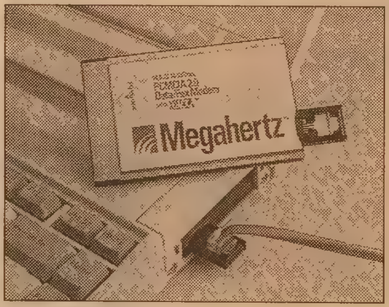

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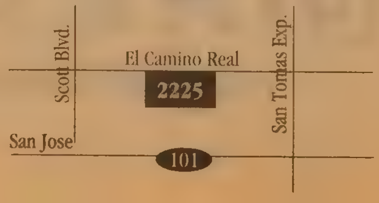

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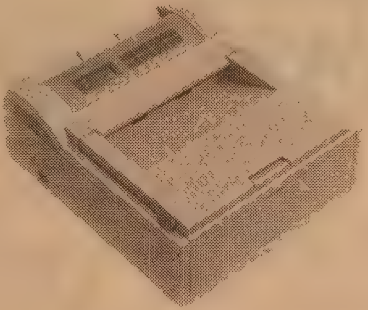

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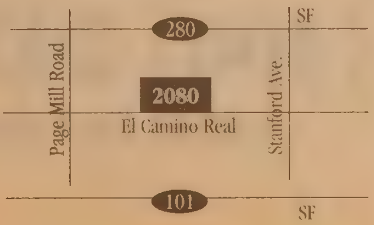

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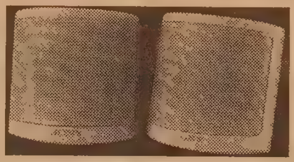

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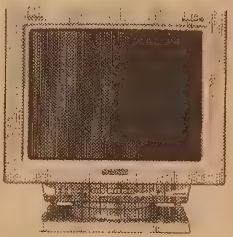

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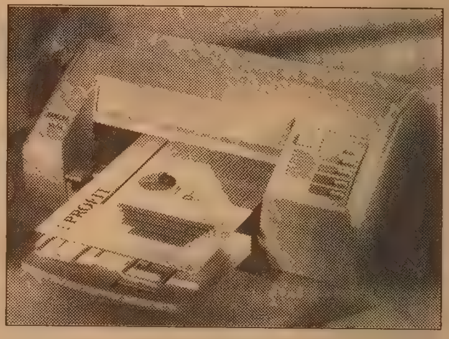

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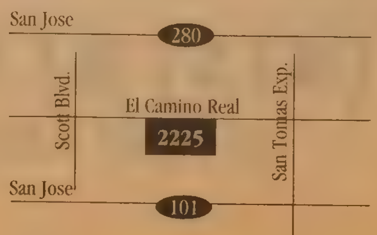

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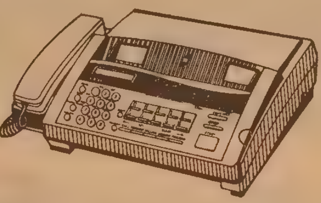

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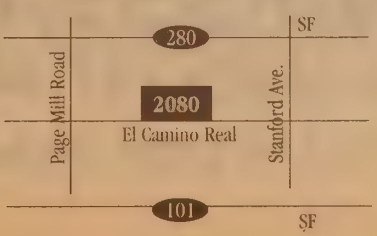

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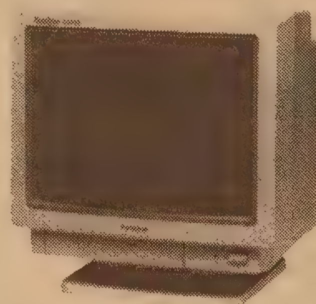

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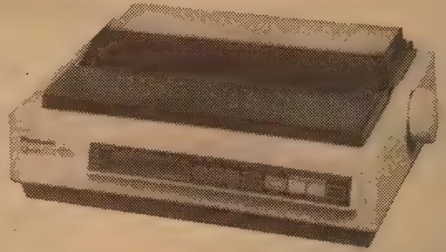

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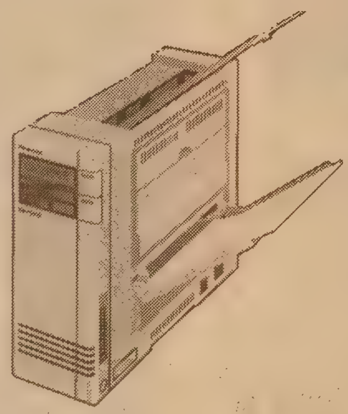

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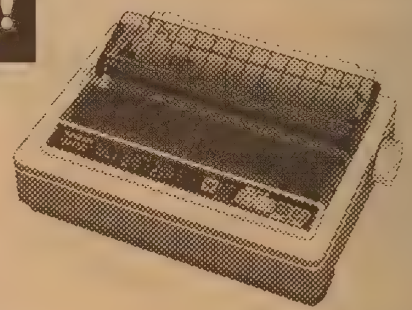

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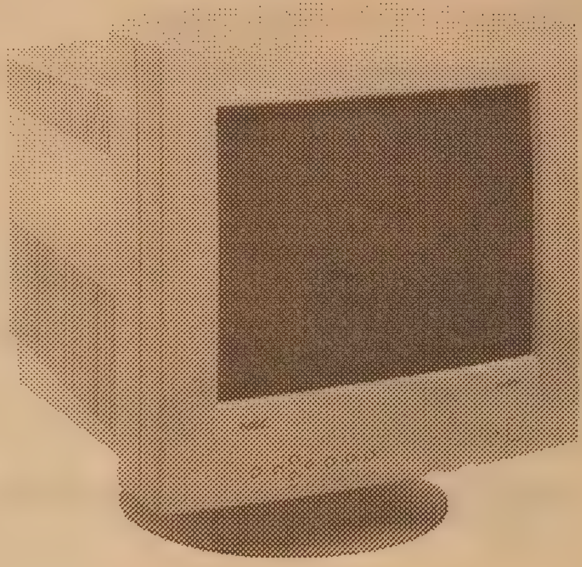

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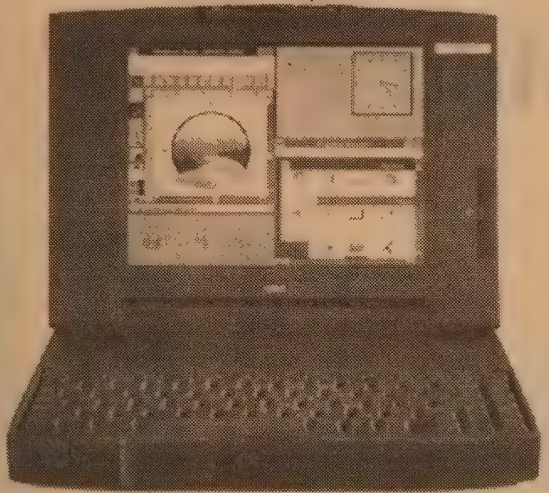

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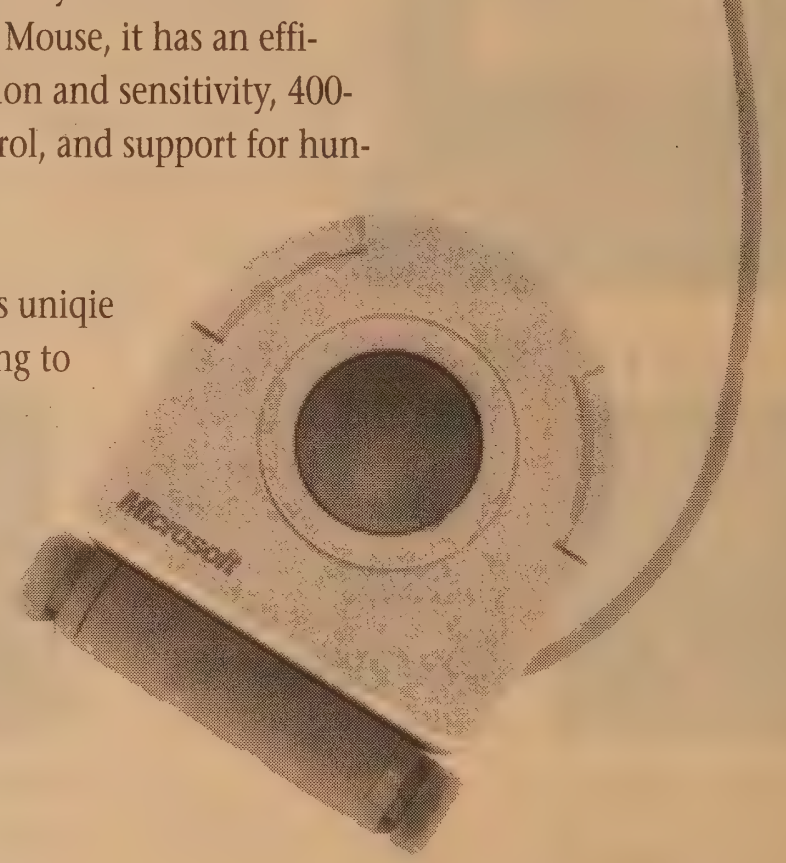

But just one look will tell you this mouse has uniqie advantages. It brings mouse-driven computing to your computer. Set the mouse to the left or right - whatever you prefer. The Ballpoint mouse can also be lowered, swiveled in, out or up to maximize the comfort of your hand.

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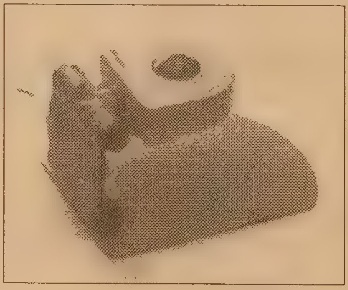

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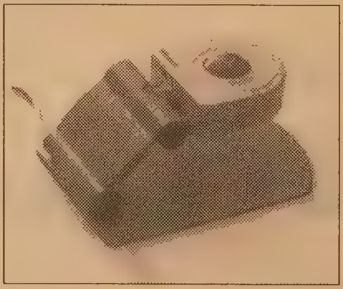
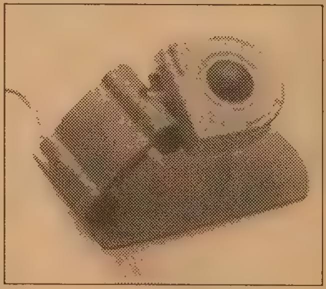


Swivel!



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LEARNING Windows: Arranging The Program Manager

Tips On Organizing The Program Manager Icons And Group Windows

By Mitch Gordon

The Program Manager is the initial window that appears when you start up Microsoft Windows. It has the special role of containing all of the icons for software that you can run, and is the place you return to whenever you exit an application. As such, the Program Manager is often seen as the "Main Menu" for Windows. It's where you reach for a program when you need one, much like reaching for a tool from a carpenter's toolbox or a scissors from a seamstress' sewing chest.

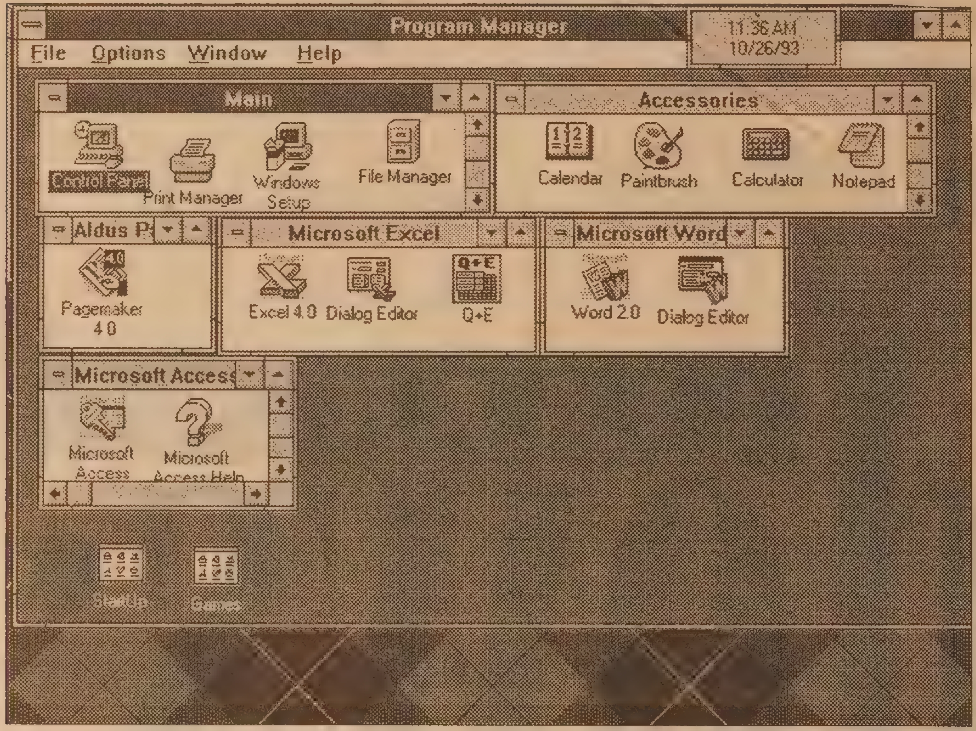
Unfortunately, Microsoft did not do a very good job of defining how the Program Manager window looks and operates when it first appears on your screen. The size of the default Program Manager window is too small to be useful, some of the program group windows are poorly named and hide each other from view, and there are too many icons for applications you are not likely to use. Fortunately, however, the Program Manager is easy to customize. Learning to do so will make you much more efficient at finding the software you need when you need it.

How application icons are arranged in group windows, and how group windows are named, sized, and arranged on the Program Manager window, provide an important key to Program Manager efficiency and friendliness.

Arranging The Program Manager Window Efficiently

New users are often frustrated with the clutter of the groups and icons in the Program Manager window, but are reluctant to change it much. But the Program Manager was designed for customization, and you can make it much

Learning Windows *continued...*



more organized. You can create your own groups; rename or delete existing ones; move application icons around between groups; stretch, shrink, and move group windows; and so on.

Here are some tips on organizing the Program Manager icons and group windows.

The Program Manager is where you reach for a program when you need one, much like reaching for a tool from a carpenter's toolbox or a scissors from a seamstress' sewing chest.

• Enlarge the Program Manager Window

The ideal size for the Program Manager window is stretched to cover almost all of the screen, leaving about an inch of space at the bottom for the desktop (technically, the "wallpaper") to show through. This area at the bottom is where small-sized (or reduced) applications icons will reside.

• Arrange Program Groups in Thin Strips

The shape and arrangement of your Program Group windows are also important. Group windows covering up other group windows cause you to waste time hunting for programs. The solution is to arrange the groups in thin strips that don't overlap one another. An ideal shape for a Group window is a small icon about 1" to 1-1/2" in height. You can easily arrange the group windows in rows so that they abut one another along the edges. This way, icons in one group are never covered up by another group's window.

How do you reshape Group Program windows and move them around? Reshaping is done by dragging the edges of a window in closer, either horizontally or vertically. When your mouse pointer on the screen is sitting at the upper or lower edge at the horizontal side of a window, it turns into a double-headed arrow, which means that dragging your mouse up or down will move the edge of that window in the corresponding direction. (Remember that "drag" means to move the mouse while holding down the mouse button until the end of the move, then to release the button.) A comparable double-headed arrow appears outside vertical window edges, allowing you to drag them to the left or right.

Moving a window is simply a matter of dragging it around by its title bar. Kind of reminds me of a mother cat carrying a kitten by the scruff.

You can achieve a crude version of the "groups in strips" technique by selecting the "Tile" option from the "Window" menu at the top of the Program Manager window. However, the results of the Tile option turn out to be much less functional than what you obtain from sizing and arranging group windows into strips yourself, and the additional time the manual method takes is largely insignificant.

To arrange application icons inside a program group window, simply drag them to a desired location. Application icons can also be dragged between group windows. I recommend that you reset the Auto Arrange option, which is found in the "Options" menu at the top of the Program Manager, to "off" (no checkmark). Auto Arrange rearranges application icons for you—usually in ways that you probably wouldn't. By leaving it off, you retain control of where icons end up.

• Hide or Delete Unneeded Application Icons

For application icons inside a group that you no longer use or want, you can delete them. To select the icon click once on it, highlighting the title underneath the icon, and then press the "Delete" key. (Note: Turn off the "Numeric Lock" feature on the keyboard to make the Delete key work like a Delete key and not like a period symbol.) You'll be prompted by the system to reassure it that you really wanted to delete this icon, and you respond by clicking on "OK."

A word to the wise: Be careful! Don't just

Terminology

Application Icons are the icons for each program. For example, the application icon for Microsoft Word is a blue letter "W" on a newsletter cover page, while the application icon for Lotus 1-2-3 consists of the digits "123" in white on a pink diamond-shaped background.

Application icons reside within the Program Manager in **Program Group Windows**, which organize the icons into logical groups. All of the programs associated with Microsoft Excel—Excel, Dialog Editor, and Q+E, for example—are kept together in a single program group window entitled (in the title bar at the top of the group window), "Microsoft Excel." Four or five default groups automatically exist in Windows—"Main," "Applications," "Startup," "Accessories," etc. A new program group window can be created every time you install software.

When you close a program group window (by double-clicking on the **control box**, which is a tiny white horizontal rectangle inside of a grey square at the far upper left corner of the group window), the group window becomes a **Program Group Icon**. Program group icons are all alike except for their captions—they always look like a tiny window containing two rows of three tiny icons. Double-clicking on a program group icon opens it to recreate the program group window that you previously closed. The group window title becomes the group icon caption, and vice versa.

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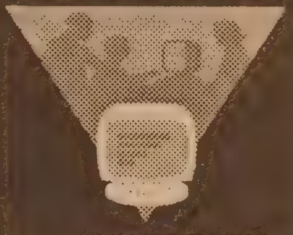

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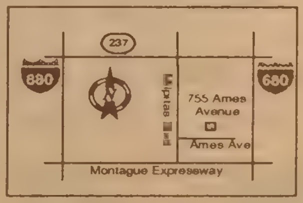

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Learning Windows *continued...*

delete everything in sight. Once you delete an application, it may be considered gone forever, unless you have a backup copy to reinstall from. Delete icons you *know* you will never need. There may be some DOS applications, such as Microsoft QBASIC and MS-DOS Editor, that Windows puts in the Applications window on installation that can be deleted, but these are exceptional cases. In general, most undesired application icons should be *hidden* rather than deleted.

My very subjective rating of the programs that come with Windows may help you decide what to keep visible and what to hide. (Look in the Windows manual for specifics on each program.)

Important Applications—Keep Readily Available: File Manager, Control Panel, Print Manager (unless you're on a NetWare or LAN Manager network), Calculator, Calendar, Windows Setup (in case you change mice or monitors), Clock, and Virus Checker. (If you need to use a bulletin board service, I would also add Terminal.)

Possibly Useful, Possibly Not: Cardfile, Notepad, Paintbrush, Terminal, Backup, Undelete, and MS-DOS Prompt.

Things I Will Probably Never Use: Clipboard Viewer, Write, MS-DOS Editor, GWBASIC, PIF Editor, Recorder, Object Packager, Character Map, Media Player, Sound Recorder, anything with the word "Dialog" in it, and anything with a Write icon (it looks like a fountain pen writing the letter "A") or Notepad icon (it looks like a wire-bound blue notepad).

There are two effective techniques for hiding undesired application icons from view. The first is to create a new group for the least-used application icons. You can call it something like "Non-Standard Applications." Drag anything you come across that fits this category into this group window. Then you can close it down to a group icon and not open it again until you actually need something from there.

To create a new program group select the "New" option in the File menu at the top of the Program Manager window. You will be asked to choose between creating a "Program Group" or a "Program Item"; a Program Group is what is needed here. You need to type in a name for the group in the box labeled "Description" (leave the box labeled "Group File" empty). Select "OK," and there is your new group window. Move and resize it to an appropriate location and shape, as you would any other group window. You can now drag application icons into it from other group windows.

The other technique for hiding application icons is to hide them in their original group window. For instance, if ten icons in a group window were created when you installed a new software package, under normal circumstances you may only be interested in seeing three. I have this situ-

New users are often frustrated with the clutter of the groups and icons in the Program Manager window, but are reluctant to change it much.

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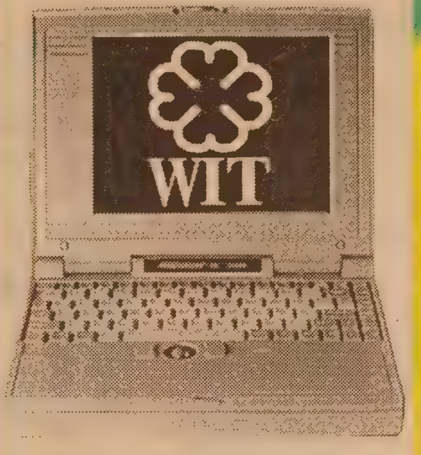

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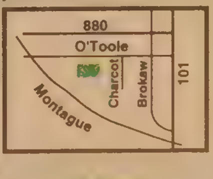

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Learning Windows *continued...*

ation with Corel Draw—it installs all kinds of applications, but I normally only use Corel Draw, Corel Photopaint, and Corel Capture. Nevertheless, I want the others kept together in case I need them in the future. What I do is reshape the Corel Draw group window to show only three icons, and rearrange the application icons in the group so that the three I regularly use are the ones showing. The seven I don't regularly use can be made visible by scrolling within the group window.

> Moving a window is simply a matter of dragging it around by its title bar. Kind of reminds me of a mother cat carrying a kitten by the scruff.

- **Close Down Unneeded Groups to Group Icons**

Groups you infrequently use should be "closed" down to group icons. To close a group, as mentioned previously, you double-click on its control box at its upper left corner. Keep your group icons (or "closed" groups) as part of a strip at the bottom of the Program Manager window, where they won't be hidden by program group windows that are open.

The "Non-Standard Applications" group I suggested should be kept on the Program Manager window as an icon, not a window. The same is true for the "Startup" group, which contains applications to run automatically on startup like the Clock. Use the same treatment for any software systems you only occasionally use. For example, if you have both Word for Windows and Ami Pro installed, but really use Ami Pro for all of your word processing, keep the Ami Pro group open with the icon showing, and close the Word group to an icon at the bottom of the Program Manager window.

You can always delete a group, just as you can delete an application icon. Bear in mind that if you delete a group without first dragging the application icons in it to another group, those application icons will be deleted. To delete a group, close it down to an icon, click on it to highlight it, click once on the Program Manager window surface somewhere to get rid of the menu that attaches itself to the icon you're trying to delete, and then press the Delete key. I would avoid deleting any groups except for ones you created yourself.

In Conclusion

If you look at the PCs of twenty Windows users, you'll see twenty different ways of arranging and configuring the desktop. Some of the arrangements will seem inefficient and cluttered, while others appear neatly arranged and colorful. The more time you spend learning how to make your Windows desktop efficient and attractive, the less time you'll spend searching through Windows to find that application, document, or tool to get your job done. ■

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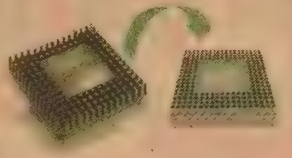

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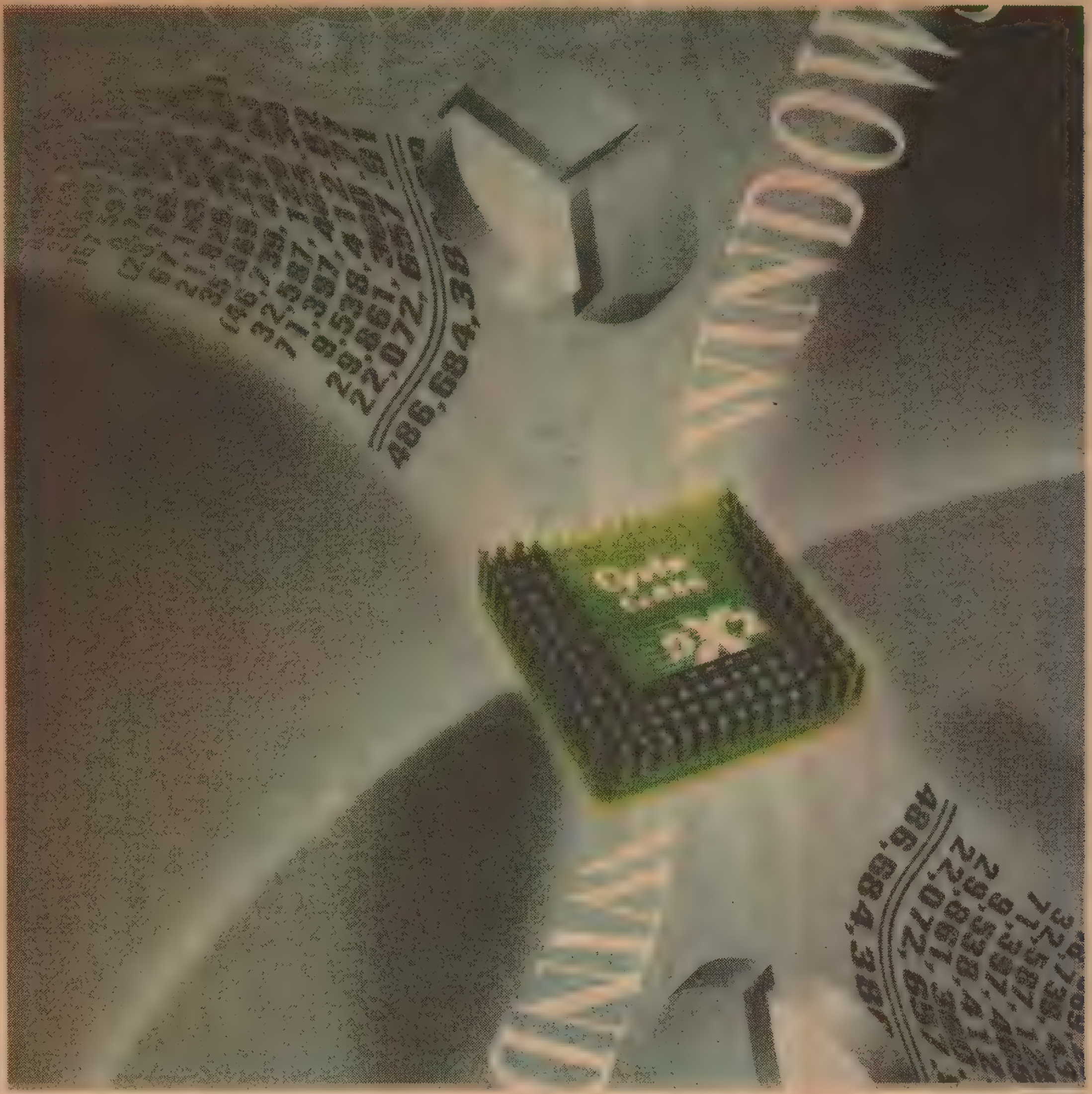

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Learning Windows *continued...*

The Clock And The Control Panel

The Clock's role is to keep the current date and time up on the screen. It needs to be set up properly to get it to stay onscreen at all times, with a shape, size, and settings that are appropriate for constant use. All of the clock settings are contained in its Settings menu, with the exception of "Always On Top," which is in the clock's control box menu. Double-click on the clock if its menu bar isn't showing, then select Settings. I recommend the Digital rather than Analog (watch-dial) setting. I also suggest leaving the Date display turned on but the Seconds turned off (watching the seconds tick off is distracting). I also size the clock so that it's about an inch wide by half an inch tall, and position it at the upper right of the screen.

To get the clock to always be on-screen, regardless of what other windows you may open or close, you need to set "Always On Top" in the clock's control box menu, and set "No Title" in the Settings menu. Finally, so that the clock gets started as an application whenever you start up Windows, drag the clock icon into the Startup group, and leave it there permanently. By the way, if the time on your clock is incorrect, that is set in Control Panel under the Date/Time heading, not from within the clock itself.

The Control Panel is where most configuration settings for Windows reside. It is well worth a little time to learn the Control Panel features under the Color and Desktop headings. The Color heading in the Control Panel is where you set the color scheme that every window will follow, including the background color, colors of titles and menus, colors of buttons, and so on. The easy way to use the Color dialog box is to simply select one of the predefined colors from the Color Scheme drop-down.

The Desktop heading in the Control Panel contains several settings that I would not suggest altering, but it also contains two that are good for making your system visually more enjoyable: Wallpaper and Screen Saver. Wallpaper is what sits behind all of your windows—it's what you see briefly when Windows boots up, and any time your other windows are not collectively covering the screen. Windows ships with several nice choices for wallpaper.

A screen saver is what appears when your monitor sits idle for too long. There is a box in the Desktop dialog box (called "Delay") for specifying the number of idle minutes before the screen saver starts working. Again, Windows includes a selection of screen savers. For relatively little money (about $30) there are commercial screen saver and wallpaper packages to choose from.

—Mitch Gordon

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intelPentium 90 CPU & M/B w/256K, 8MB, 540MB IDE HDD, Diamond Stealth 32 w/2MB,Teac 3.5" FDD,Logitech Mouse, Maxi Key, Pentium Cooler & Heatsink,Color Fulltower Case w/PS :$1,888
w/Mulimedia (Mitsumi CD-ROM, SB16, 50W Speaker) :$2,140
Multimedia W/Nanao 21"(Rfb.) Monitor :$3,660

Ecomomy Class $1,060
Intel 486DX66 cpu, 486M/B w/256K(up to DX4-100), 8MB, 420MB HDD Diamond Stelth24, I/O, Teac 3.5 FDD, Logitec Mouse, Maxi Key,CPU Cooler &Heat Sink, Minitower Case w/PS & Digital
w/ 14" .28 N/I Digital Green Monitor, :$1,288

Business Class $1,650
Intel 486DX66 cpu,486M/Bw/256K(up tpDX4-100), 8MB, 540MB IDE HDD DiamondStelth24 w/1MB, Teac 2in1 FDD, I/O, Mitsumi CD-ROM,Media Magic Sound card, Logitec Mouse, Maxi Key, CPU Cooler, 50W Speaker, Fulltower Case w/PS & Digital
**Nanao 17" monitor (Refb.) with System :$2,235

First Class $3,050
Intel Pentium 90 CPU, Intel Pentium 90M/B w/256K, 16MB, Adaptec 2940 PCI, 540MB SCSI HDD, ATI Mach 64 PCI w/2MB, Teac 2in1 FDD, Toshiba CD-ROM, SB 16, MS Mouse, Maxi Key, 80W Speaker, Pentium Cooler & Heat sink, Fulltower Case w/PS&Digital.
W/Nanao 21"(Rfb.) :$4,600

Graphic Card
ATI Mach 64 VLB/PCI/ISA 4M/2M $495/$285
ATI Mach 32 VLB w/2MB, $235
Diamond Stelth 24 w/1MB, $125
Diamond Stealth 32 w/2MB, VESA or PCI $208
Diamond Viper SE w/2MB, VESA or PCI $315

Controller
ISA IDE/FDD/2s/1p/1g$12
VESA IDE/FDD/2s/1p/1g$18
Adaptec AHA2940S $215
Adaptec AHA1515 $79
Adaptec1522A $130

Network
Addtron 10base-T/BNC Combo $49
Klever Hub 16port, BNC, AUI, $449
3 COM Etherlink 3 Combo $149

Mother Board (w/o CPU)
Air SE w/256 $110
Air MIS w/256k $240
intel PCI 90w/256k$390
Taiwan486DX4 100 3VL 4ISA
Green 256k 72p $130

Multimedia
Toshiba 3401B Interna $248
Mitsumi w/interface $125
SB 16 Value Edition $98

Accesery
Microsoft Mouse $25
Joystick $15
CPU Cooler&heat sink $ 8
Maxi Switch Keyboard $30
Pentium Cooler $17

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Product Spotlight

UPDATES

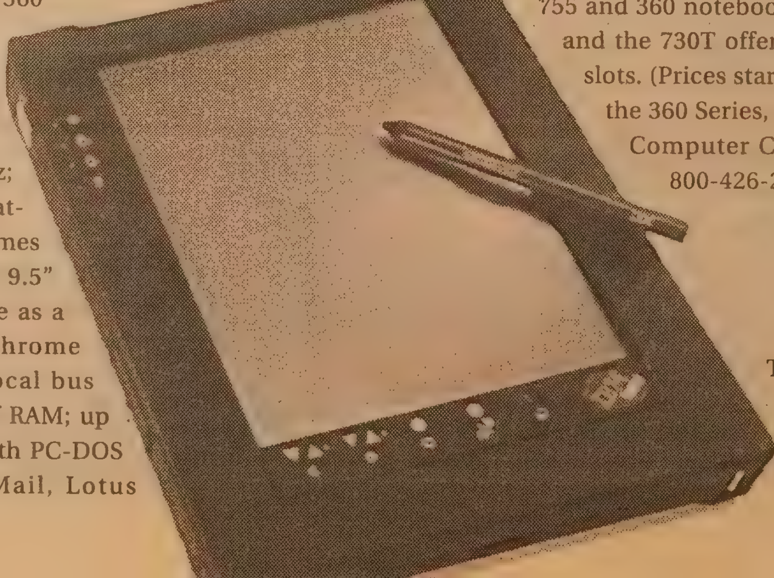
- **ACI** announced that the **Power Macintosh versions of 4th Dimension, 4D Server, and 4D First will be free to existing customers.** ACI US, Inc., 20883 Stevens Creek Blvd., Cupertino, CA 95014. 1-800-384-0010.
- **Action Technologies** released **ActionWorkflow Manager for Lotus Notes v1.5**, targeted at individual users to deliver immediate workflow benefits out of the box. It is priced at $199 per user. Action Technologies, 1301 Marina Village Pkwy., Suite 100, Alameda, CA 94501. (510)521-6190.
- **Crosswise** is shipping **Face to Face v2.0**, the first cross-platform document conferencing software solution for both Windows and Macintosh users. It is available for $179 for the Windows or Macintosh version. Crosswise Corporation, 105 Locust St., Suite 301, Santa Cruz, CA 95060. (408)459-9060.
- **Data Description** released **Data Desk v4.2 Non-Transferable License**, a specially priced version of its data analysis software package designed for full-time students. It is available for $90 plus shipping upon submission of an application form and current student ID. Data Description, Inc., P.O. Box 4555, Ithaca, NY 14852. (607)257-1000.
- **Data Discovery** announced **v2.0 of TrueList**, its program for identifying and removing probable duplicate addresses from mailing lists. The price is $149. Data Discovery, Overland Park, KS. 1-800-808-3838.
- **Fractal Design** is shipping **Fractal Design Painter v3.0**, the latest version of its natural-media paint and image-editing program. It is available for Macintosh, Power Macintosh, and Windows for $499 retail; $149 for registered users of Painter 1.0, 1.2, and 2.0; and $99 for users of Painter X2. Fractal Design Corporation, 335 Spreckels Dr., Aptos, CA 95003. (408)688-5300.
- **Okidata** announced **DOC•IT Software Release 3.2**, which provides additional functionality and increased fax and printer performance. Upgrade kits are available to registered users free of charge through December 31, 1994. Okidata, 532 Fellowship Rd., Mount Laurel, NJ 08054. 1-800-OKI-TEAM, ext. S.
- **Ontrack** announced **Drive Rocket v1.14**, the newest version of its data accelerator for IDE hard disk drives. Current owners can upgrade for $19.95, retail price is $39.95. Ontrack Computer Systems, 6321 Bury Dr., Minneapolis, MN 55346. 1-800-752-1333.
- **Panacea** has released a **free update for all owners of its TurboDLD*Deluxe* v2.0** in the form of a utility that fixes several minor bugs and adds support for new graphics hardware. Panacea, Inc., Post Office Square, 24 Orchard View Dr., Londonderry, NH 03053-3351. 1-800-729-7420.
- **Shany** is shipping **AlertVIEW 2.3**, an upgrade to its software for automatically detecting, reporting, correcting, and preventing application problems. Shany, Inc., 1101 San Antonio Rd., Mountain View, CA 94043. (415)694-7410.
- **Softwarehouse** announced **Connection Manager v3.7**, an upgrade to its modem server package for IPX and NetBIOS networks. A Lite package is available for $195, and the standard version is $395. Softwarehouse Corporation, 326 State St., Los Altos, CA 94022. (415)949-0203.
- **Specular** is shipping **Specular Collage 2.0**. The new version has been optimized in many areas and is Power Macintosh native. It is available to registered users for $49, $399 retail. Customers who purchased Specular Collage 1.0 after July 20, 1994, can receive the upgrade free. Specular International, 479 West St., Amherst, MA 01002. 1-800-433-SPEC.
- **Xinet** released **v8 of its suite of file sharing and print server software for Macintosh and UNIX systems.** K-AShare, K-Spool, K-FS, and K-Talk allow Macs and UNIX workstations to share files and PostScript printers. Xinet, 2560 Ninth St., Suite 312, Berkeley, CA 94710. (510)845-0555.

New Products

Portables/PCMCIA

IBM ThinkPads

IBM has released new lines of its ThinkPad mobile computers: the ThinkPad 755 Series notebooks, the ThinkPad 360 Series notebooks, and the ThinkPad 730T Tablet. The 755 Series is offered with a choice of two color screens, a 10.4" TFT active-matrix or a 9.5" dual-scan passive-matrix; two processors, Intel's DX4-75/25MHz or DX2-50/25MHz; local bus video; parity memory; and an integrated microphone and speaker. The 360 Series comes with either an 8.4" TFT active-matrix color, a 9.5" dual-scan passive-matrix color (also available as a pen-based convertible model), or a monochrome screen; an Intel 486SX-33MHz CPU; and local bus video. Both series have an expandable 4MB of RAM; up to 540MB hard drives; and come preloaded with PC-DOS 6.3, Windows 3.1, America OnLine, cc: Mail, Lotus Organizer and ScreenCam, Official Airlines Guide FlightDisk, Prodigy, FaxWorks 3.0, and Co-Session. The 730T Tablet is a pen-based tablet designed for on-the-go, forms-based applications. It features a transflective screen, up to ten hours battery life, is preloaded with Pen for OS/2 or PenDOS and Windows for Pen Computing, and weighs 3.5lbs. All the ThinkPad models have Level 2.01 PCMCIA slots: the 755 and 360 notebooks are configured with a Type III slot, and the 730T offers either two Type III or three Type II slots. (Prices start at $3599 for the 755 Series, $1999 for the 360 Series, and $2569 for the 730T) IBM Personal Computer Co., Route 100, Somers, NY 10589. 1-800-426-2968.



Commax Smartbook III

The Smartbook III is the newest member of the Smartbook family of upgradable notebooks. It employs a 486 platform and is available as a

Continued on page 208

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MANUFACTURED BY IBM®

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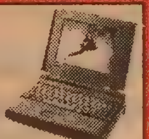
486SL-33MHz SUB NOTEBOOK



486SL-33MHz CPU • 4MB RAM 4.1 lbs. • External 3.5" 1.44MB Floppy Drive Integrated Pointing Device PCMCIA II

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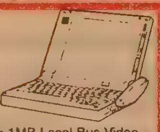
Thinkpad 486SX-33MHz Color Notebook



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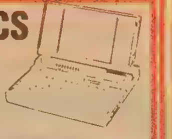

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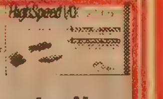

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Game Port

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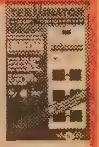

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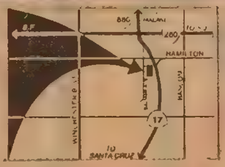

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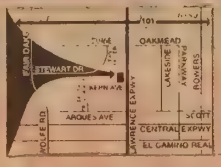

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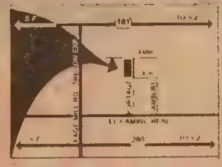

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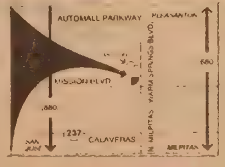
(415) 496-6044



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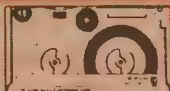

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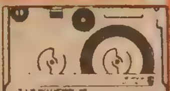

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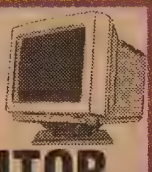

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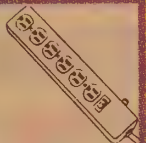

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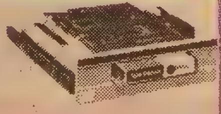

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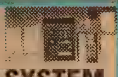

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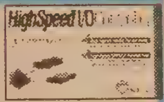

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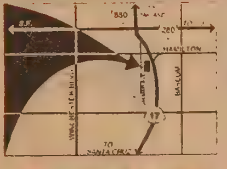

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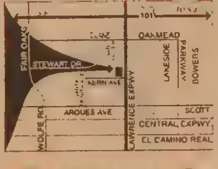

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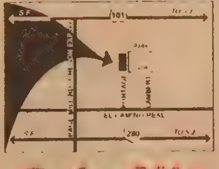

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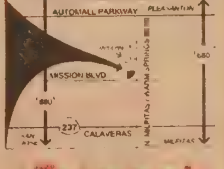

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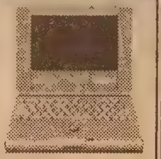

68LCO40 Processor • 66/33 MHz Speed • 4MB RAM, expandable to 40MB • Optional external Apple SuperDrive® Floppy Disk Drive • Serial Port Docking Connector • Power Adapter Port • Modem Port • Integrated Microphone and Speakers • 9" backlit active-matrix display with 16 levels of gray.

$2949

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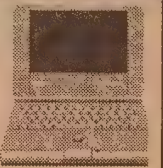
Apple® PowerBook Duo® 280C 12/320 w/modem



is Apple's top-of-the-line color subnotebook computer.
Features include: 66/33MHz Speed • 4MB of RAM expandable to 40MB • High performance Motorola 68LCO40 processor. Built-in, active matrix color display • Ability to accommadate a future version of the PowerPC™ processor PowerBook® Mobility Bundle preinstalled software.

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- Color, audio and ADB ports
- 8-bit color (256 colors) on monitors up to 16"
- 4-bit color (16 colors) on 19" and 20" monitors
- Requires external power.

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7MD-C
#1895139

NEWER DUO SCSI MICRODOCK

- SCSI and ADB connectability
- SCSI and ADB ports
- Supports SCSI and SCSI Disk modes
- Provides two SCSI operating modes
- Fits all PowerBook Duo computers
- Fast and easy way to transfer files between your Duo and another MAC
- Requires no external power.

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Monitor and Keyboard Sold Seperately

PowerPC 601 RISC processor; integrated math coprocessor 60 megahertz speed • 8MB of RAM, 2MB of VRAM, built-in 1.44MB Apple SuperDrive® • 250MB Hard Drive • Internal CD-ROM drive Two S-video to composite video adapters. • Integrated floating-point unit and 32K cache. • Power Macintosh™ will run DOS and Windows™ applications with SoftWindows™ by insignia Solutions

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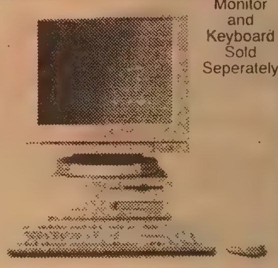
PowerPC™ Apple® Power Macintosh™ 7100/66 AV 16/500 W/CD-ROM



Monitor and Keyboard Sold Seperately

Features include • 66MHz PowerPC 601 microprocessor with floating-point processor and 32K Cache • DRAM display support • 1MB of VRAM for second display support, expandable to 2MB • NTSC or PAL monitors™. Power Macintosh™ will run DOS and Windows™ applications with SoftWindows™ by insignia Solution.

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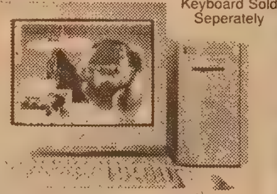
PowerPC™ Apple® Power Macintosh™ 8100/80 16/500 w/Soft Windows



Monitor and Keyboard Sold Seperately

PowerPC 601 RISC processor; integrated math coprocessor and 256K memory cache• 80 megahertz speed • 2MB VRAM • Expansion slots for three NuBus expansion cards • Apple Desktop Bus™ Port Video input/output port • Standard monitor port • GeoPort™ • Telecommunication Capabilities • Built-in support for all Apple® displays and supports several third party VGA and SVGA displays. Built-in LocalTalk® and high-speed Ethernet connections; AppleTalk® networking software. • Power Macintosh™ will run DOS and Windows™ applications with SoftWindows™ by insignia Solutions

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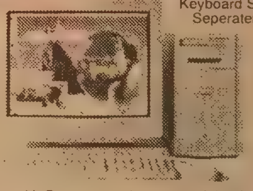
PowerPC™ Apple® Power Macintosh™ 8100/80 AV 16/500 CD-ROM



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Apple® AudioVision™ Display

AudioVision™ 14 Display integrates high-quality stereo speakers, microphone, and high-contrast display into a single, sleek package. Speakers deliver CD-Quality sound . Display Quality:

- 14-inch screen, 640 horizontal pixels by 480 vertical lines (at 70 dots per inch)
- Trinitron color picture tube with improved electronics for higher brightness, high contrast and uniform contrast

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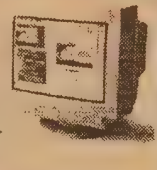
Apple® Multiple Scan 15" Display

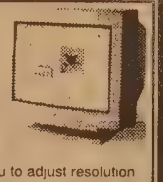


The Apple® Multiple Scan 15 Display is a high-quality monitor. It features the state-of-the-art Flat Square Screen and stereo speakers • antiglare surface treatment with a flicker-free refresh rate to minimize eyestrain • 640 by 480pixels to1,024 by 768 pixels It includes stereo speakers and a headphone jack.

$489

#1956771

Apple® 20" Color Multiple Scan Display



- Multiple-scan technology allows you to adjust resolution
- 20-inch screen Sony Trinitron tube
- Comes with a tilt-and-swivel base that allows you to position the monitor for optimal viewing comfort
- Complies with the EPA's EnergyStar conservation guidelines
- Adjustable resolution through software (included): Selectable from 640 by 480 pixels to 1152 by 870 pixels

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Apple® Adjustable™ Keyboard

With its new ergonomic design, the Apple® Adjustable Keyboard lets you work the way you feel most comfortable. Its main feature is a "split" alphanumeric keyboard that lets you adjust the left- and right-hand sections up to a 30-degree angle to find the typing position that feels right for you, Detachable palm rests provide a flat surface to rest your hands when you're not typing. The ergonomic design helps your wrists stay in a neutral position for comfort and typing ease. The Apple® Adjustable Keyboard also includes volume and record keys that make it easy for you to control sound, a valuable feature in multimedia applications

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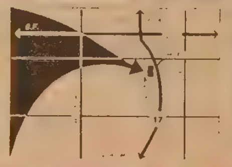

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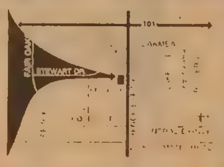

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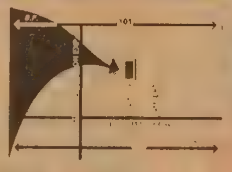

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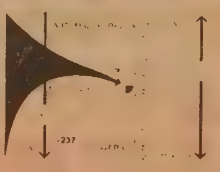

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Expandable to 36MB • 250MB Hard Drive
32,768 Colors • 14" Apple 28mm Non-Interlaced Display AppleTalk® LocalTalk® • 16 Bit CD Stereo • Internal Stereo Speakers • Headphone Jack • Global Village 2400 BPS S/R Modem/ 9600 BPS Fax Send

Free Software: System 7.1P with Launcher, At Ease and Macintosh PC Exchange, ClarisWorks 2.1, Quicken 4, Mac Gallery Clip Art, Click Art Performa Collection, MacLink Plus Translators Pro, Macintosh PC Extange, At Ease American Heritage Dictionary 3rd Edition, KidWorks 2, Thinkin' Things, The Writing Center Spectre Challenger, Spin Doctor Challenge, Crossword Wizard

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And adds impact to your files with QuickTime movies!

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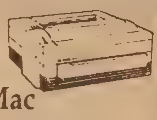

LaserJet 4ML
Laser Printer for Mac

- 26 built-in scalable typefaces let you shrink and enlarge type to thousands of sizes.
- 300 dpi Laser printing with HP Resolution Enhancement Technology and microfine toner for smooth, sharp text and graphics.
- 1MB standard memory with Memory Enhancement Technology effectively doubles your printer memory.

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The BEST print quality in the industry

12 pages per minute printing for Macintosh and mixed Mac/Pc environments • True 600 dpi output • Adobe™ PostScript™ Level 2 and enhanced HP PCL 5 printer languages • 80 scalable typefaces - 35 Adobe Type1, 35 Intellifont, 10 TrueType™ • 6MB standard, expandable up to 38MB • 250 sheet paper tray and 10-envelope multipurpose tray

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Apple®
LaserWriter
Select® 310

The Apple® LaserWriter Select® 310 is the most affordable PostScript™ laser printer ever to come from Apple®, and is designed for personal use by both Macintosh® and Windows computer users. You'll appreciate the printer's speed. And with PostScript™ printing, you'll also get high-quality results and compatibility with all the major application programs.

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#1767784

Apple®
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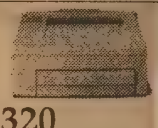
LaserWriter® 320



provides advanced print capabilities in Apple's most affordable Adobe™ PostScript laser printer. It's a fast, quiet, energy efficient printer that's ideal for home or office.
Features include:
• 300 dpi • 16MHz Speed • 2MB RAM • 39 scalable fonts • 100-sheet paper tray • LocalTalk and high speed RS-422 Serial interfaces • Comes with a RISC processor so you can print at a quick 4ppm • Provides TrueType® and Adobe™ PostScript fonts in a range of typefaces.

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320 Portable Printer

- Crisper, blacker blacks with 600 x 300 dpi printing plus HP's Resolution Enhancement Technology
- Compact, portable design fits nearly into a briefcase
- Easy-to-add color with an optional HP Color kit (sold separately) just snap in the cartridge and print

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Printer for Mac

Outstanding print quality in black and color. This clear, sharp,professional-quality with 600 x 300 dpi black output has HP's Resolution Enhancement Technology for smooth, crisp characters, fast text printing at 3 ppm for black and 4 mpp for color. 256 levels of grayscale Energy efficient.
Three year limited warranty.

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Apple®
Portable
StyleWriter® Printer

The Apple® Portable StyleWriter® printer goes anywhere and everywhere with Apple® Macintosh® and PowerBook® computers. It delivers high-resolution output, and versatile paper handling, all with smooth, quiet performance. And it even fits inside a briefcase. The Portable StyleWriter® weighs only 4.5 pounds, and works with any PowerBook®, Apple® PowerBook Duo®, or Macintosh® computer, using a rechargeable battery or a standard power source. It can print in a horizontal or vertical position, so you can use it in even the most confined spaces, whether you need to print on letterhead, envelopes, labels, or transparencies.

$379

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Apple®
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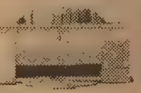
StyleWriter® Pro



is an ink-jet printer that provides high-quality color printing in a compact design. It is a versatile printer that's perfect for home or office use, since it lets you print your color files at your desk at about half the cost per page of other desktop color printers.The Color StyleWriter® Pro includes 64 scalable TrueType® fonts and yields a resolution of 360 dots per inch; ColorShare and ColorSync®.

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The best CD-ROM game is now available for the Macintosh. Features Include:
- Astonishing 3-D Graphics
- Over a dozen action-packed levels
- Full screen video from the Star Wars movies
- Digitized Speech and movie sound effects.

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LUCAS Arts
MAC CD-ROM
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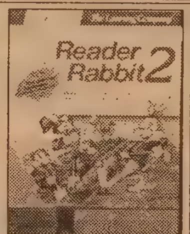
The Learning Company®

Reader Rabbit 2



Reader Rabbit 2 is designed to motivate first and second grade level children to read on their own as they build a foundation for successful reading.
It helps children with:
Word Building,
Vowel Sounds,
Word Concepts,
Early Dictionary Skills

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MAC
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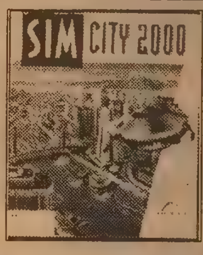
SIM CITY 2000



SIM CITY is primarily a "building game" where you create and try to increase the size of your cities. You can build small rural towns, or huge, bustling megalopolises.

MAXIS

$42⁹⁵

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SIMPSONS SCREEN SAVER

Your favoite TV show is now available on software.
- Over forty of your favorite characters
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- PowerMac Compatible
- EcoLogic™ Power Manager

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ORGANIZER FOR MACINTOSH®

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Claris Organizer

Claris Organizer gives you three things you've been searching for in a Personal Information Manager
- Easy to use program of tasks, calendar, contacts and notes.
- Automatic linking of calendar, to do list, phone numbers and addresses.
- New low introductory price.

$48⁹⁵

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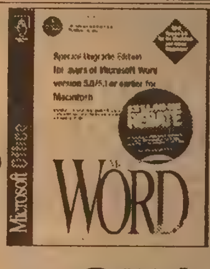
Microsoft® Word 6.0 Upgrade for MACINTOSH®



Special upgrade for users of Microsoft Word 5.0/5.1 or earlier.

*After $30 Mail-In Rebate. For Licensed Users Only. In-Store Price... **$124.95**

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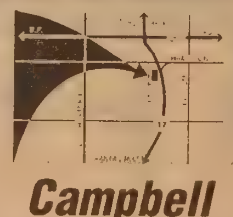

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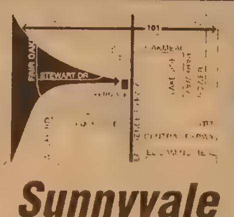

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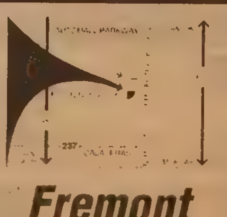

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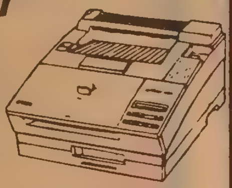

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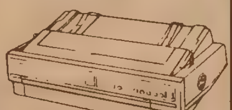

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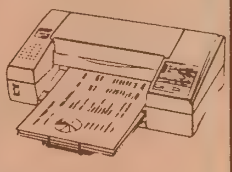

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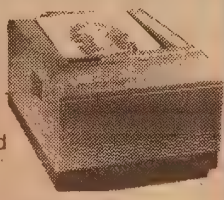

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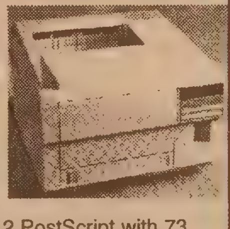

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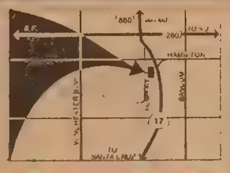

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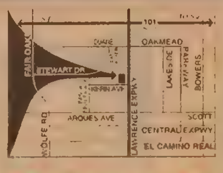

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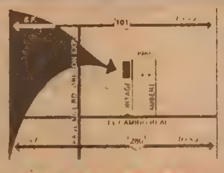

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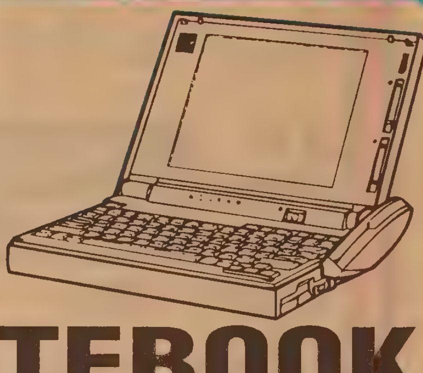

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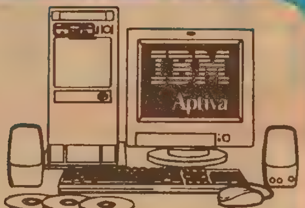

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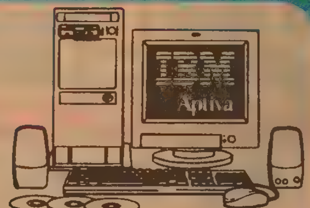

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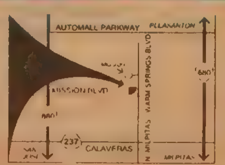

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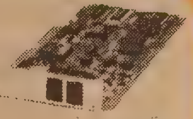

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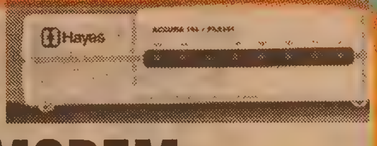

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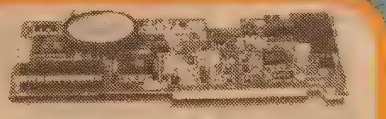

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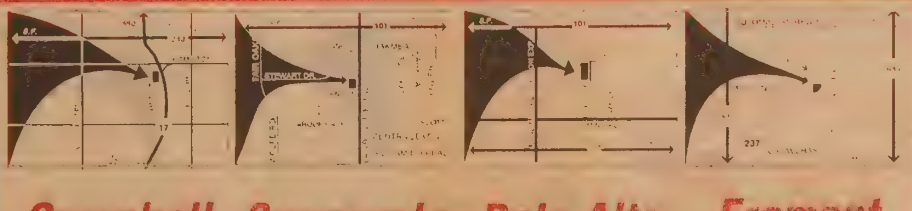

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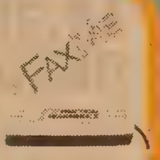

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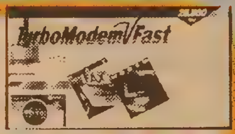

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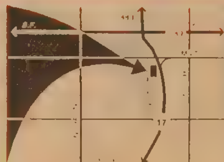

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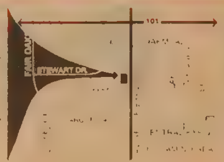

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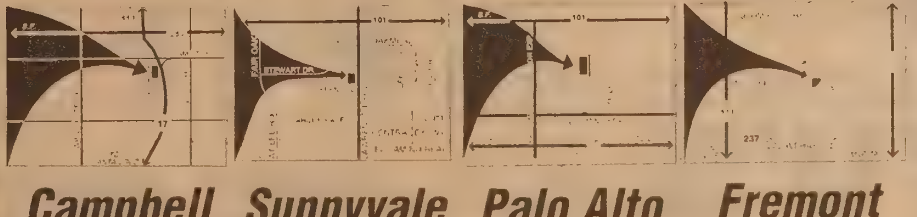

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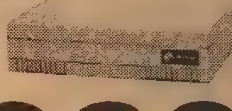

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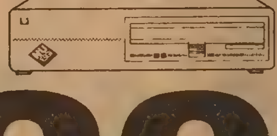

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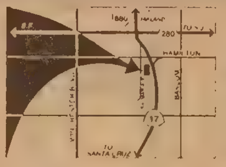
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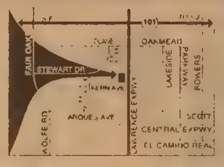
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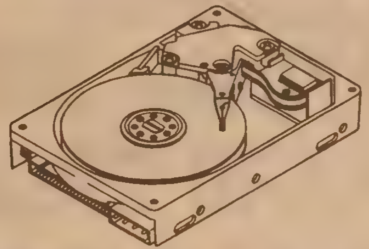

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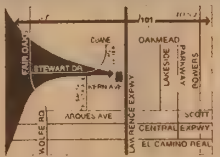
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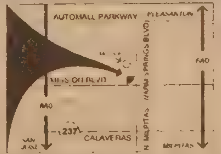
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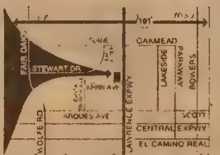
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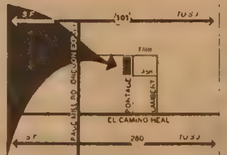
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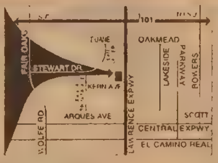
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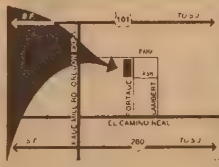
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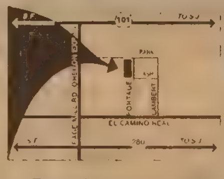
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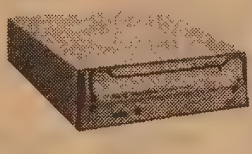

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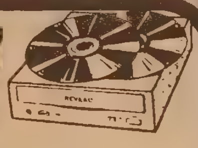

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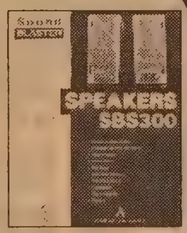
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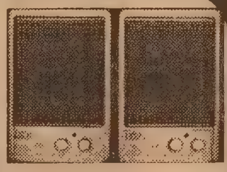

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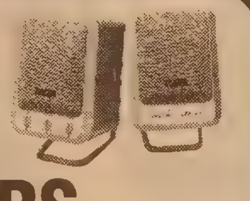

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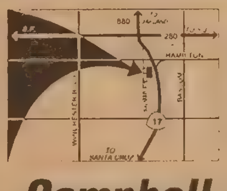
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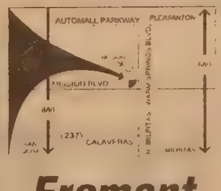
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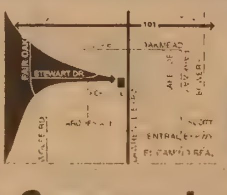

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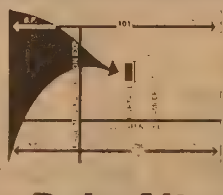

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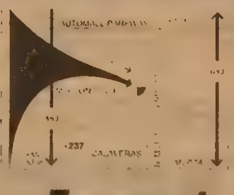

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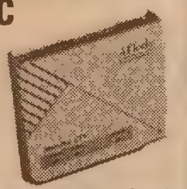

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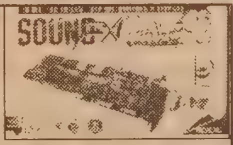

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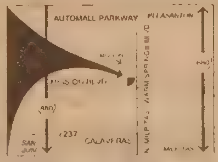

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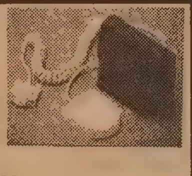

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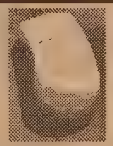

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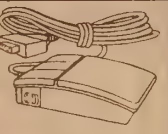

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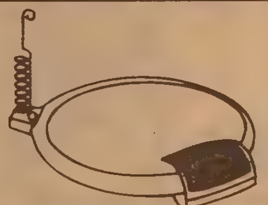

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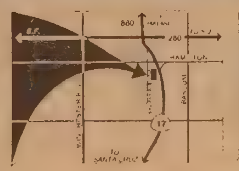

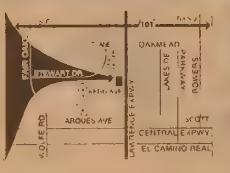

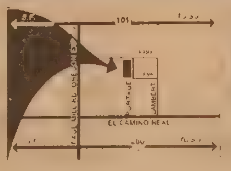

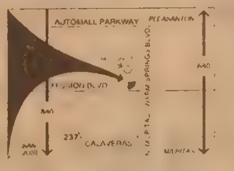

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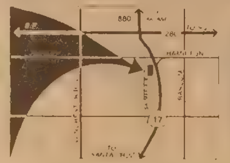

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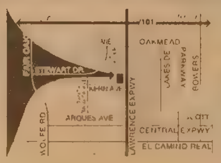

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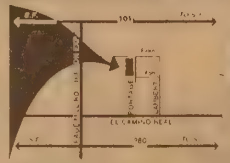

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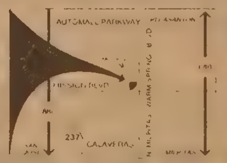

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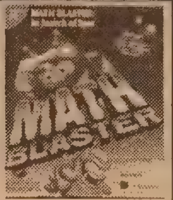
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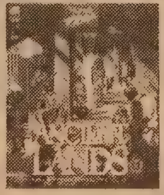
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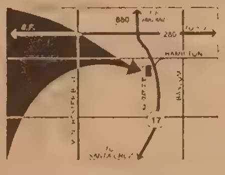
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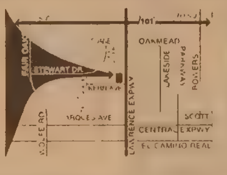
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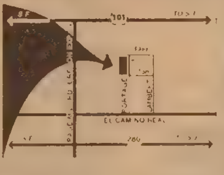
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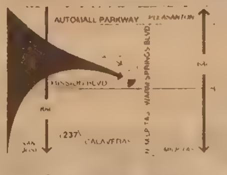
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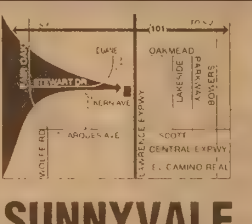

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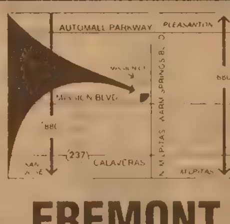

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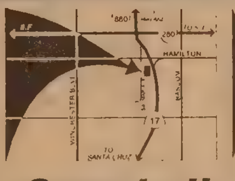

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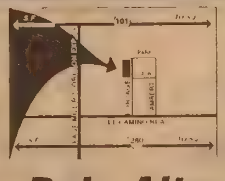

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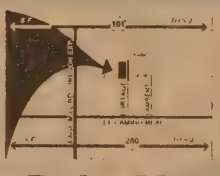
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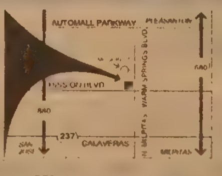
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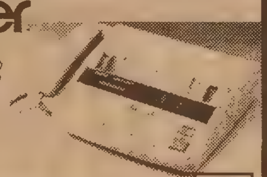

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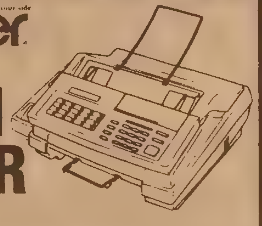

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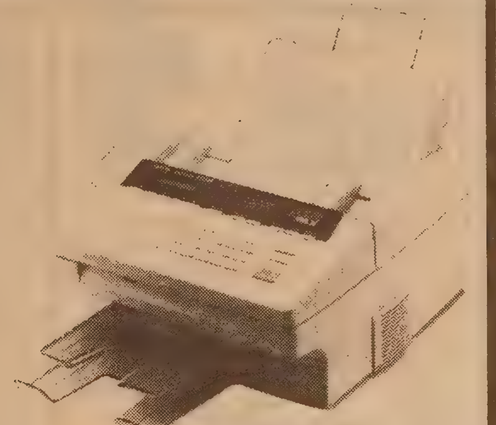

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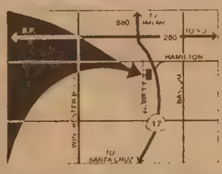

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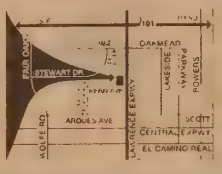

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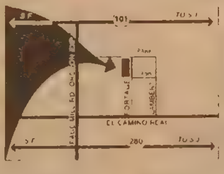

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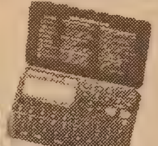

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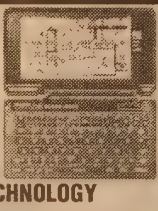

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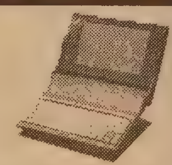

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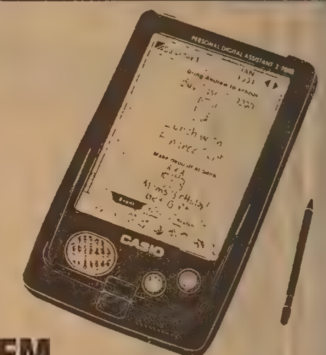

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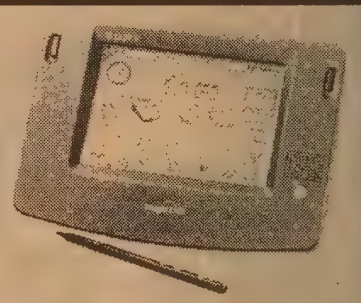

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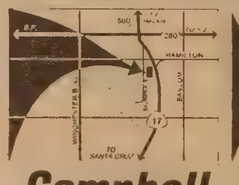

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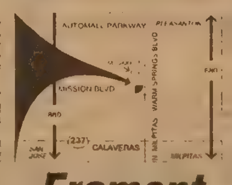

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Answering System with Auto-Logic Operation, Tone Remote Control, Digital Display, Message Memo Recording and remote turn on, Auto-Logic Operation automatically rewinds, plays messages, stops at the last message and resets itself at the touch of one button.

$\$39^{99}$

MODEL KX-T1000
#1498194

Panasonic

DUAL MICRO CASSETTE ANSWERING SYSTEM

Panasonic's new dual micro cassette answering system offers an LCD Call Counter, marker message, room monitor, auto disconnect, electronic auto disconnect, electronic volume control, audible message alert, and much more for only...

$\$69^{95}$

MODEL KX-T2100
#1740208

Panasonic

DUAL MICRO CASSETTE ANSWERING SYSTEM

WITH VOICE TIME/DAY STAMP

Panasonic's new dual micro cassette answering system offers an LCD Call Counter, marker message, room monitor, auto disconnect, electronic auto disconnect, electronic volume control, audible message alert, and much more for only...

$\$89^{95}$

MODEL
KX-T2300
#1740219

Panasonic

TWO LINE ANSWERING MACHINE

WITH VOICE TIME/DAY STAMP

Perfect for the home or office, this Panasonic two line answering machine offers voice time/day stamp, voice prompts, 2 variable greeting messages, room monitoring, message alert, call screening, auto interrupt, toll saver, and more. Now just...

$\$129^{95}$

MODEL KX-T5300
#1768084

BUSINESS PHONES

Panasonic

SPEAKERPHONE

For the office or home, this phone has all the features you need. It has a speaker phone, 28 station automatic dialer, automatic redial and much more.

$\$49^{95}$

MODEL KX-T2315
#1530100

Panasonic

TWO LINE SPEAKERPHONE

A perfect compliment to your home or office, this two-line speakerphone comes equipped with 3-way conferencing, 20 number programmability, seperate ring switches for each line, and a local mode function. Now only...

$\$69^{95}$

MODEL KX-T3120
#1510676

Panasonic

TWO LINE SPEAKERPHONE

WITH LCD DISPLAY

From Panasonic comes this fully featured 2-line speakerphone with LCD display, 3-way conference call, volume control for speaker and handset, 24-station one-touch dialer, auto redial, flash, separate ringer tone, line status indicator, memo dial, and save redial, all for only...

$\$89^{95}$

MODEL KX-T3175
#1745122

Panasonic

THREE LINE SPEAKERPHONE

WITH LCD DISPLAY

From Panasonic comes this fully featured 3-line speakerphone with LCD display, 3-way conference call, volume control for speaker and handset, 48-station one-touch dialer, auto redial, flash, separate ringer tone, line status indicator, memo dial, and save redial, all for only...

$\$169^{95}$

MODEL KX-T3185
#1768039

10 CHANNEL CORDLESS PHONES

Panasonic

10 CHANNEL AUTOSCAN CORDLESS PHONE

This cordless phone comes equipped with a retractable flexible rubber antenna, sound charger technology, which helps filter out background noise resulting in enhanced sound quality, and 1-way paging between the base and handset. An excellent value at only...

$\$79^{95}$

MODEL KX-T3850
#1764839

Panasonic

10 CHANNEL CORDLESS PHONE

WITH QUICK CHARGE & SECURE GUARD SYSTEM

Panasonic has developed the latest in cordless technology by incorporating a Quick Charge system that will enable you to recharge its battery in one hour providing 7-day standby or 3 hours providing 21-day standby! The Secure guard system can help keep your conversations private and help prevent eavesdropping scanners or baby monitors. Other features include one paging, 10 number memory, last number redial, flash, auto security code settings and much more for only...

$\$118^{95}$

MODEL
KX-T3940
#1820915

Panasonic

10 CHANNEL AUTOSCAN CORDLESS DUAL KEYPAD SPEAKERPHONE

WITH SECURE GUARD VOICE SCRAMBLING

Panasonic's comes equipped with secure guard which scrambles your voice when others try to listen in on your conversations with other cordless phones, radios or even scanners! Other features include quick charge technology enabling to fully charge the battery in only 3 hours for 21 day standby, 2-way paging, intercom, 10 number memory, high gain antenna, and much more. All for only...

$\$159^{95}$

MODEL
KX-T3965
#1886160

Panasonic

10 CHANNEL CORDLESS SPEAKERPHONE

WITH DUAL MICROCASSETTE

This top of the line cordless dual microcassette answering system with sound charger technology delivers sound so clear, you will hardly believe your ears! Some of the features included are: 2-way paging, intercom, auto security system, message alert, 2-way and memo recording just to name a few. Now only...

$\$199^{95}$

MODEL
KX-T4400
#1802450

FAX MACHINES

Panasonic

FAX MACHINE

WITH PAPER CUTTER AND SPEAKERPHONE

Panasonic line of fully featured fax machines start with this compact model which includes 64 level grayscale, super thermal paper compatible, paper curl reduction, 164' paper roll capacity, 15 page document feeder, distinctive ring, delayed transmission, paper save mode, telephone directory with alpha-search, 12 station one-touch with 28 station speed dialing, and much more. All for just...

$\$299$

MODEL
KX-F550
#1944271

Panasonic

PLAIN PAPER FAX MACHINE

WITH 20 PAGE MEMORY

The ultimate plain paper fax from Panasonic features a jumbo LCD display, 70 page paper cassette, adjustable letter/legal tray, 32 level halftones, polling, activity reporting, 20 page document feeder, broadcasting to 128 locations, fax transfer, enlargement and reduction copier functions, fax/tel switch, 28-station one-touch dialer, 100-station speed dialer, telephone directory with alpha-search, and much more! Now just.....

$\$899$

MODEL
KX-F3000
#1850626

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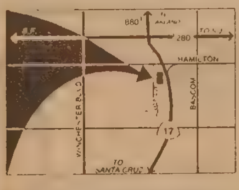

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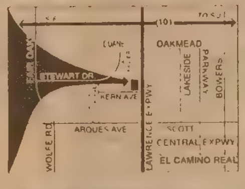

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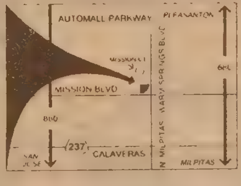

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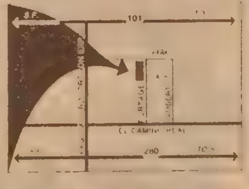

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SPEAKERPHONES

BELL Phones
BY NORTHWESTERN BELL PHONES

SPEAKERPHONE
WITH 13 NUMBER MEMORY

The convenience of a handsfree speakerphone allows you to do other tasks while carrying on a conversation on the phone. Features include 13 number memory, auto redial, mute, flash, and more. An excellent addition to any home or office at only...

$19⁹⁹

MODEL 4350
#1917518

SONY.

SPEAKERPHONE
WITH 32 NUMBER MEMORY

From the leader in cordless phone technology comes a new line of feature phones. This unit has a crystal clear speakerphone, 32 number memory and more!

$49⁹⁵

MODEL IT-D100
#1516878

Panasonic

LCD READOUT SPEAKERPHONE

This outstanding value from Panasonic offers a 12-digit LCD readout for phone number, clock, call timer(minutes and seconds), and operating modes. Perfect for the home or office at only...

$69⁹⁵

MODEL KX-T2365
#163665

SONY.

TWO LINE FEATURE PHONE
WITH SPEAKERPHONE

Phones with 2-line operation are relatively common, but this phone offers a distinctive ring for each line! The LCD indicator will tell you the number dialed and the time. Now only..

$79⁹⁵

MODEL IT-D250
#1516904

MULTI-LINE PHONES

BELL Phones
BY NORTHWESTERN BELL PHONES

TWO LINE PHONE

Perfect for the home office with multi-line needs, this 2-line phone from Northwestern Bell features line-in-use LEDs, 3-way conferencing, 15 number memory, hold, flash, pause, and ringer controls. An excellent value at...

$39⁹⁹

MODEL
Easytouch 2202
#1890905

Panasonic

TWO LINE PHONE

A two line phone doesn't have to cost a fortune. Panasonic has the low cost answer for you. This unit has a convenient auto dialer, conference calling and much more!

$69⁹⁵

MODEL KX-T3110
#1505313

Panasonic

TWO LINE SPEAKERPHONE
WITH LCD DISPLAY

From Panasonic comes this fully featured 2-line speakerphone with LCD display, 3-way conference call, volume control for speaker and handset, 24-station one-touch dialer, auto redial, flash, separate ringer tone, line status indicator, memo dial, and save redial, all for only...

$89⁹⁵

MODEL KX-T3175
#1745122

AT&T

THREE LINE SPEAKERPHONE

AT&T's multi-functional centrex compatible 3-line speakerphone comes equipped with page, intercom, 3-way conference, LCD display, 40 number memory, auto line selection, hold, do not disturb function, auto-redial, mute, programmable pause, call transfer, flash, seperate ringer controls, and more, all for only.....

$179⁹⁵

MODEL 843
#1853892

ALL DIGITAL ANSWERING MACHINES

AT&T

ALL DIGITAL ANSWERING MACHINE

This AT&T answering system utilizes tapeless digital technology to ensure consistent recording quality over the life of the system. The convenience of new message playback, outgoing message bypass, remote system turn on or off and remote message recording makes this an excellent value at only...

$69⁹⁵

MODEL 1710
#1853906

BELL Phones
BY NORTHWESTERN BELL PHONES

ALL DIGITAL ANSWERING MACHINE
With Time Day Stamp & 13 Minute Capacity

This fully featured all digital answering machine from Northwestern Bell comes equipped with Time/Day Stamp, Programmable Security, Selective Skip or Erase, Call Screen, Extension Pickup, Auto Disconnect, Multiple Memo Record,' Toll Saver, VOX, 13-Minute Capacity, Remote Access, and much more! An incredible value at just...

$69⁹⁹

MODEL 700
#1964820

Panasonic

ALL DIGITAL ANSWERING MACHINE
WITH VOICE TIME/DAY STAMP

This Panasonic all digital answering machine comes equipped with 30 minutes of total recording capacity and voice promps for time, AM/PM, voice remote menu, number of messages, pre-recorded greeting messages, and time/day stamp on each message. Other features include LCD readout, quick playback, message alert, room monitoring, 2-way and memo recording, and much more! Now just...

$159⁹⁵

MODEL KX-T8100
#1914607

AT&T

ALL DIGITAL ANSWERING SYSTEM SPEAKERPHONE
WITH 2-LINE • 4 VOICE MAILBOXES • 26 MINUTE TOTAL CAPACITY

AT&T's Tapeless digital technology ensures instant access and consistent recording quality. The individual voice mailbox system incorporated into this unit allows callers to leave separate messages for up to 4 people. Each of these voice mailboxes allows for a personal outgoing announcement By utilizing the selective save and delete functions you can save the entire message or only the parts you need, and easy to follow prompts will direct you through a menu of remote commands when calling from a touch tone or rotary telephone. Other features include voice/time stamp, handset playback and record, display screen indicating time, day, and number dialed, audible message alert, priority calling, memo, and 2-way call recording. An invaluable addition to any home office at

$199⁹⁹

MODEL 1872
#1954997

COPIERS

SHARP

PORTABLE COPIER

This Sharp copier weighs in at just 14.8 lbs. and is amazingly compact and lightweight, making it easy to be carried or stored in a small place. Features include auto exposure control, auto start function, auto power shut-off mode, which completely cuts the power approximately 90 seconds after you finished copying. An excellent value at only.....

$279

MODEL Z-20
#1885620

SHARP

LETTER/LEGAL PERSONAL COPIER

Compact and lightweight, this Sharp copier weighs only 17.5 lbs. and fits virtually anywhere! Yet, it even lets users make multiple copies up to legal size (81/2" x 14") originals onto a wide range of papers from 81/2" to 4" x 6", allowing an expanded range of applications. Other features include auto exposure, 50 sheet paper tray capacity, auto start function and much more! An excellent value at just...

$429

MODEL Z-27
#1892837

SHARP

LETTER /LEGAL COPIER
WITH STATIONARY PLATEN

This durable Sharp copier utilizes a stationary platen, a space-saving feature that eliminates the possibility of the copier bumping into objects while in operation. The variable zoom ratio setting adjusts between 70% and 124% in 1% increments giving you more copying flexibility and versatility. Other features include large capacity 250 sheet tray, continuous copy (up to max. 50), auto start, and letter/legal capacity. An excellent value at...

$697

MODEL Z-85
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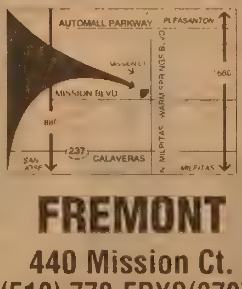

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CNN
E!
TRAVEL
TBS
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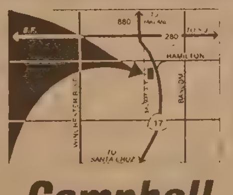

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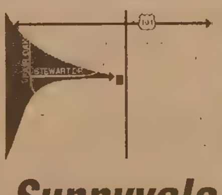

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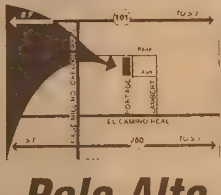

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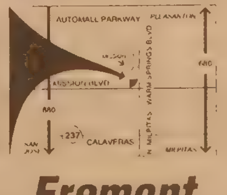

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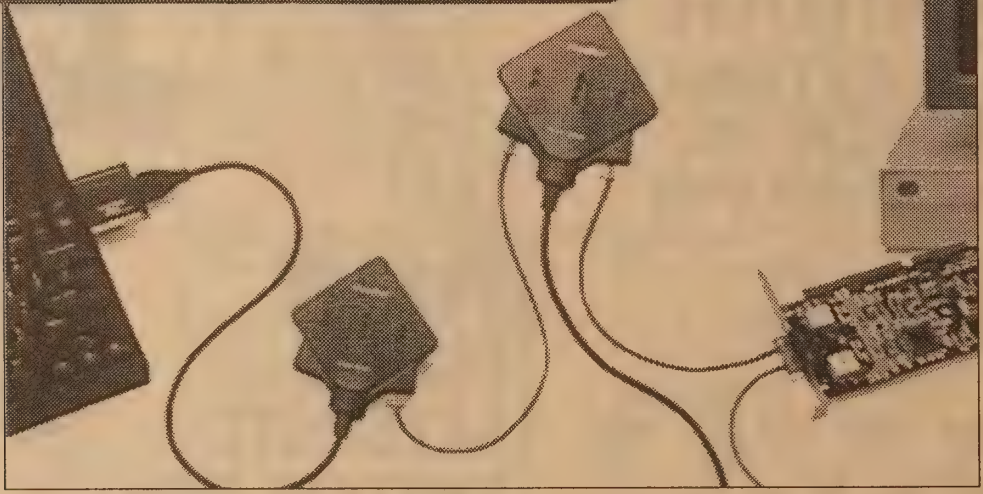
Continued from page 176

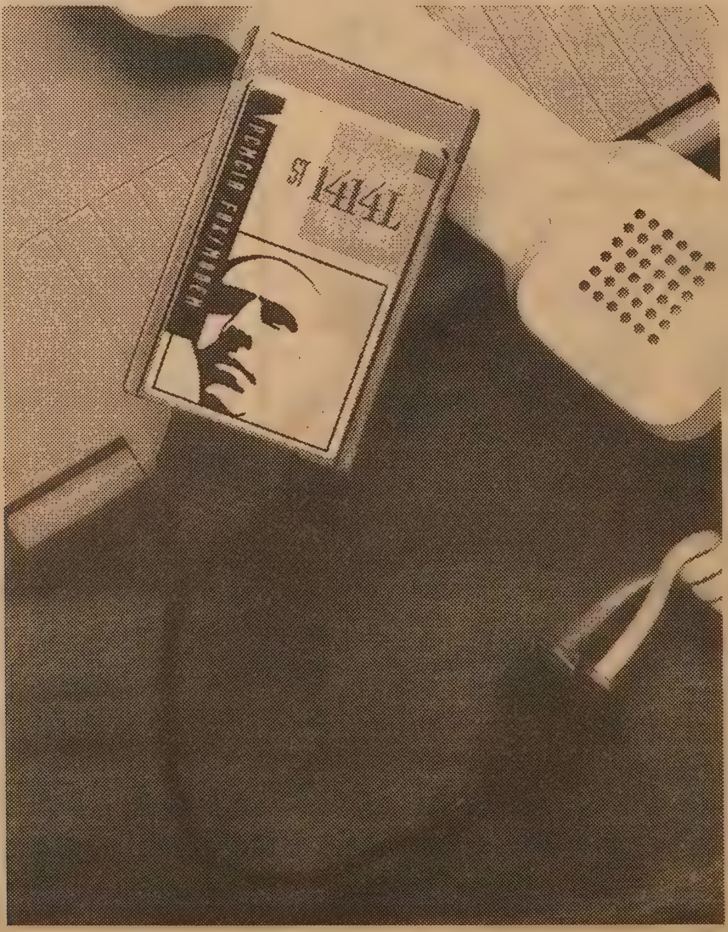
Top to bottom: Commax Smartbook III; Farallon's EtherWave PCMCIA Adapter; Smart Modular Technologies' PCMCIA Voice/Fax Modem.

486DX-33, 486DX2-50, 486DX2-66, and 486DX4-100. All models feature detachable 9.5" screens in dual scan or active matrix color; 32-bit VESA Local Bus video with 1MB of video RAM; one Type II and one Type III PCMCIA slots and a Type IV expansion slot; built-in digital audio sound with record and play back via a built-in speaker, built-in microphone, and line-in/line-out jacks; a removable hard drive; and an ergonomic keyboard with a built-in trackball surrounded by wrist rests. (The DX4-100 with dual scan monitor, 200MB hard drive, 4MB of RAM, IBM PC-DOS 6.3, Windows 3.11, and a carrying case starts at $2595) Commax Technologies, Inc., 2031 Concourse Dr., San Jose, CA 95131. (408)435-5000 or 1-800-526-6629.



EtherWave PCMCIA Adapter

Farallon's EtherWave PCMCIA Adapter connects PC notebook computers directly to 10BaseT Ethernet networks. It enables notebook users to carry with them everything they need to connect to any 10BaseT Ethernet network at any location. Network managers can provide portable users with full 10Mbps access to network resources such as printers and servers without requiring a dedicated hub port connection. Each adapter includes a Type II PCMCIA adapter, a Farallon EtherWave connector, and a 4.5-meter length of category 3 unshielded twisted-pair cable. ($299) Farallon Computing, Inc., 2470 Mariner Square Loop, Alameda, CA 94501-1010. (510)814-5100.



PCMCIA Voice/Fax Modem

Smart Modular Technologies has added voice capabilities to its family of high-speed PCMCIA-based fax/data modems. The ST1414L supports an extended command set for voice applications, including voice mail, mailbox, and fax-back capabilities; microphone and speaker interfaces; use of a handset; and ADPCM and A-law compression. It features an ultra-low-power sleep mode and built-in DAA line interface circuits. It provides complete data and facsimile capabilities at 14,400bps with V.42 and V.42bis compliance, as well as error correction and data compression for a maximum data throughput of 57,600bps. The ST1414L offers auto dial and auto answer and includes an embedded AT command set. It can be connected to a telephone line with a one-piece cable that is included; the phone line interface circuitry is built in. ($299) Smart Modular Technologies, 45531 Northport Loop West, Bldg. 3B, Fremont, CA 94538. (510)623-1231.

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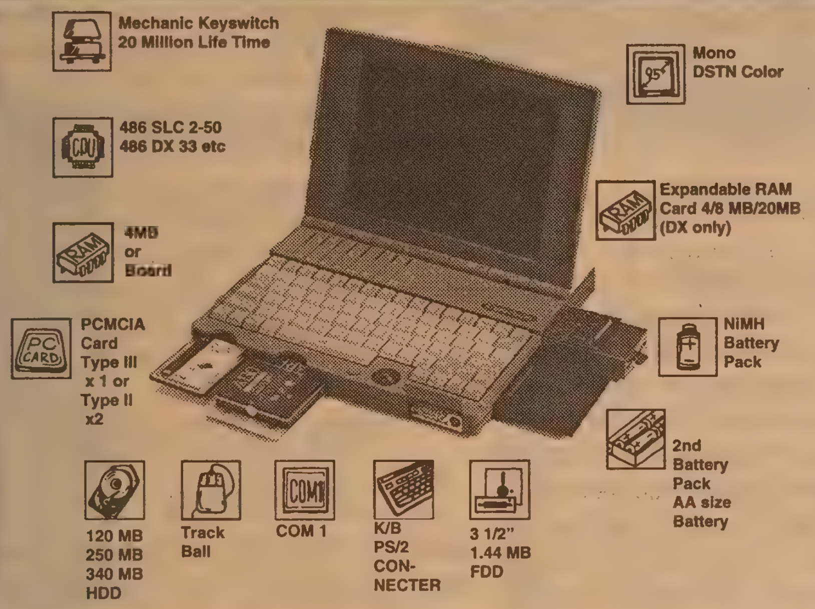

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14.4 Fax/Modem with Voice

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The easiest connection with a wonderful high speed (DTE line rate up to 57,000 bps) and the most stability firmware design via the serial port of your PC. LED function display shows the operations status which helps users to trace the system easily. We provide a total solution for your PC to communicate as a Data Modem, Fax Machine and even Answering Machine with an outstanding performance and fantastic control function that traditional machines can never perform.

PCMCIA
14.4 Fax/Modem

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With the dimensions of a business card, our PCMCIA type II Fax/Data Modem provides your Notebook PC with the strongest connection capability and versatile function to achieve the ultimate communications performance that's more than your expectations.

Pocket Size
14.4 Fax/Modem

$99

With compact design and battery supports, our portable Pocket Fax/Modem helps you to exchange data around the world wherever you are and whenever you want. It suits not only your Notebook PC, but also all kinds of PCs to share data with the outside world.

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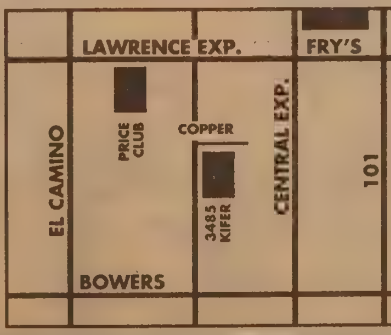

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Bottom left: eVote User's Manual from Frontier Systems; top right: Math Ace Jr.; bottom right: Sammy's Science House from Edmark Corp.

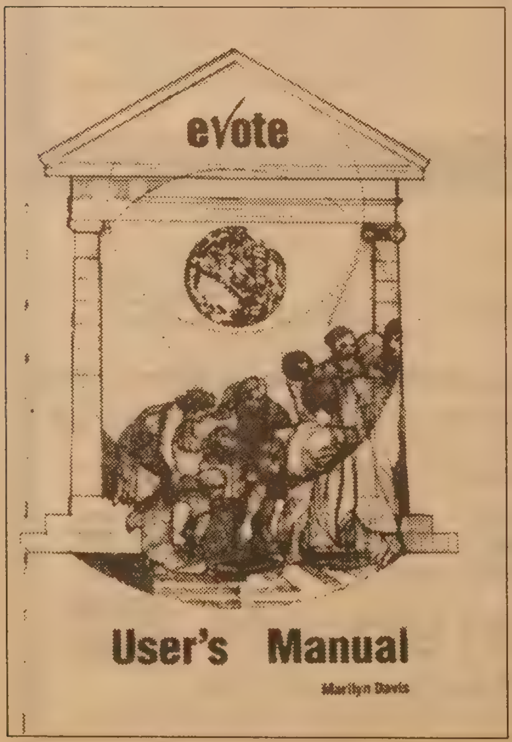
UNIX

Frontier Systems' eVote

eVote, for electronic voting, invites any member of the electronic community to propose a vote on any subject. The vote's author directs eVote to take a yes/no or numeric vote. Votes can be public, private, or if-voted, where the community can see who has voted on the issue but not how. Voters can change or withdraw their votes while the vote is in progress. In addition, eVote supports the grouping of issues and democratic budget-spending. The software's architecture was designed to target conferencing systems in the business, education, and hobby sectors. It is available for SunSoft INTERACTIVE UNIX and SCO UNIX. ($80; a Programmer's Kit is available for $800) Frontier Systems, 3790 El Camino Real, Suite 147, Palo Alto, CA 94306. (415)493-3631.

Silicon Graphics IRIX 6.0

IRIX 6.0 is an enhanced 64-bit version of the System V Release 4 UNIX operating system. It takes advantage of a multi-threaded symmetric multiprocessing architecture and offers the capabilities to handle floating-point intensive applications. IRIX 6.0 supports the creation of applications that use 64-bit features of the new MIPS R8000 superscalar RISC microprocessor, supports all existing 32-bit applications, and comes with MIPSpro compilers, a complete family of optimizing 64-bit compilers for R8000-based systems. It will be available on Silicon Graphics' Power Challenge line of shared-memory supercomputing systems. Silicon Graphics, Inc., 2011 N. Shoreline Blvd., Mountain View, CA 94043-1389. (415)390-5255.



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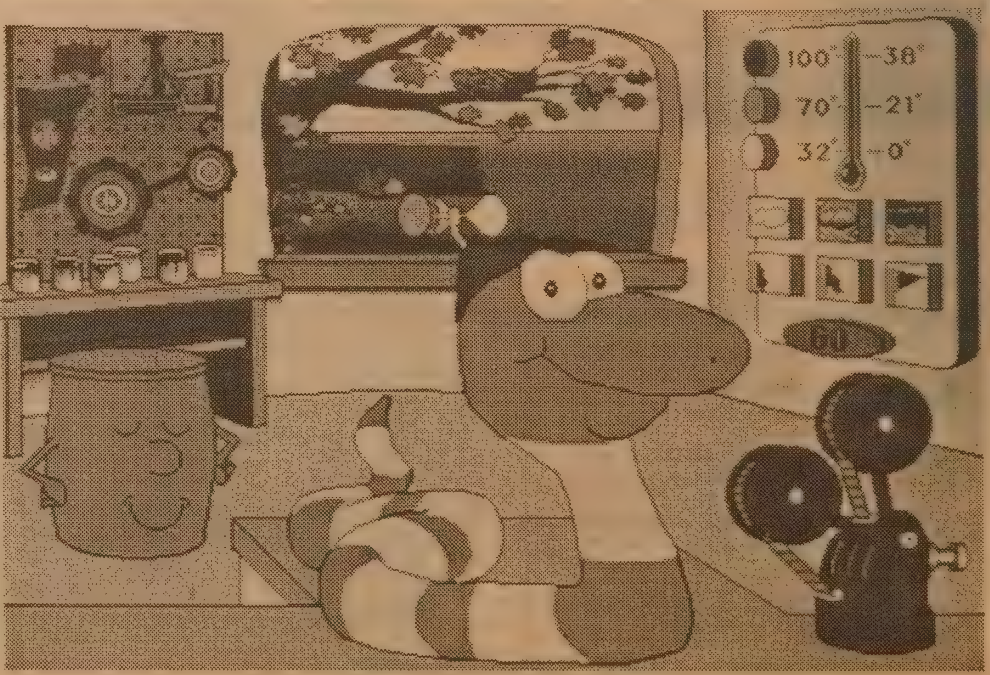

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Kids' Software

Math Ace Jr.

Math Ace Jr. features a combination of real world applications, visual math, and manipulatives to encourage children aged four to eight to learn math. Users will learn fifteen essential math concepts, including adding, subtracting, multiplying, identifying shapes and patterns, counting money, and telling time. There are four scaled levels, from "kindergarten" to "third grade." The goal is to build an aquarium with zany fish and wild treasures while mastering nine engaging math activities. Each time a math problem is answered correctly, kids receive either a fish or the opportunity to buy treasure. Available in both MPC and Mac formats. ($49.95) Magic Quest, 125 University Ave., Palo Alto, CA 94301. (415)321-5838.

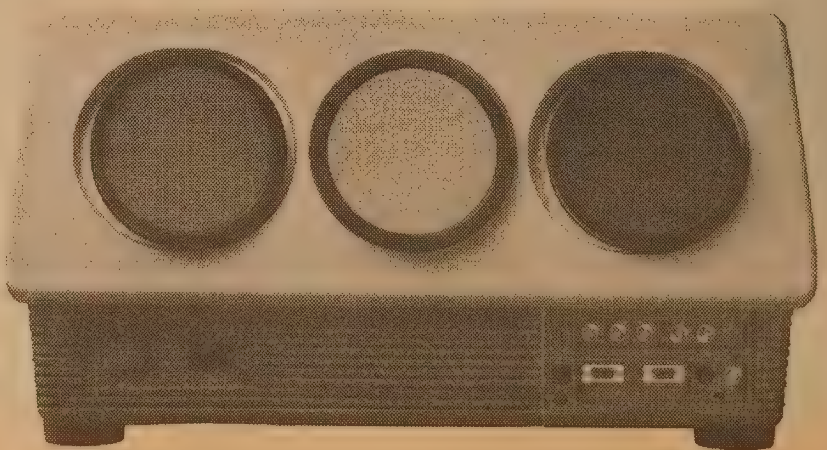
Edmark's Sammy's Science House

Sammy's Science House is specifically designed to help children ages two to five build early science skills. There are two modes of learning in the program that help children develop two important types of thinking skills. The Explore and Discover Mode helps build divergent thinking skills that promote creativity and inventiveness, and the Question and Answer Mode builds convergent thinking and systematic problem-solving skills. In addition, there are five types of activities: putting things in order; learning

Continued on page 336

Below: the Kodak DCS 420 Digital Camera; bottom: the NEC MultiSync 9PG Plus color projector.

Nikon
Kodak
DCS



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486DLC-40/128K VLB	822
486DX-33/128K VLB	872
486DX-40/128K VLB	882
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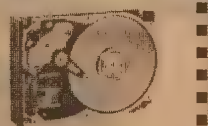

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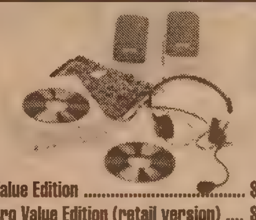

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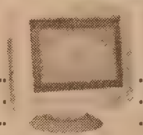

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DTC 2280 ISA IDE	$14
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5. Return shipping must be insured, prepaid and bearing an RMA# on the shipping label.
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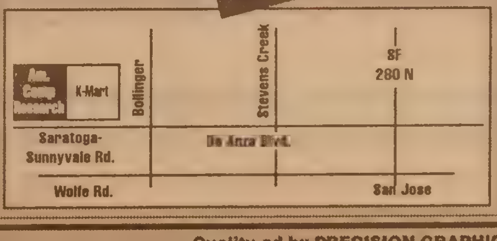

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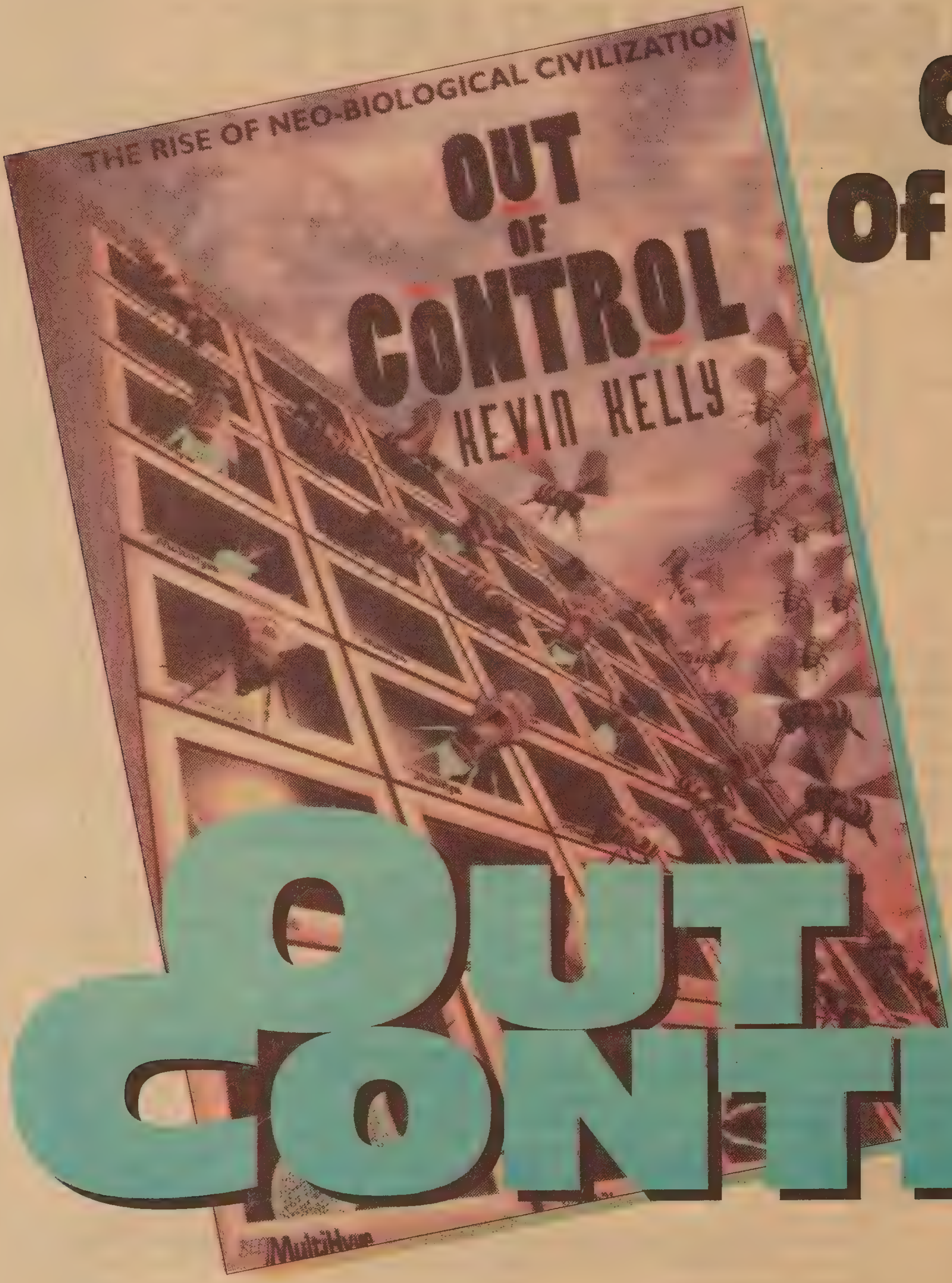


OUT OF CONTROL:

The Coming Convergence Of Biology And Technology

An Interview With Kevin Kelly

By Birrell Walsh

Will the software that runs your office one day be evolved rather than written?

Will it be friendly or unfriendly?

Will robots, imitating schools of fish, explore space in swarms?

In a hypernetworked world, will people pay for the privilege of being *disconnected* from the Net? Will privacy become something only the rich can afford?

Will new currencies grow up like grasses? Will you choose your currency provider the way you now choose your long-distance company: for the convenience, trustworthiness, and—oh most important—anonymity they offer?

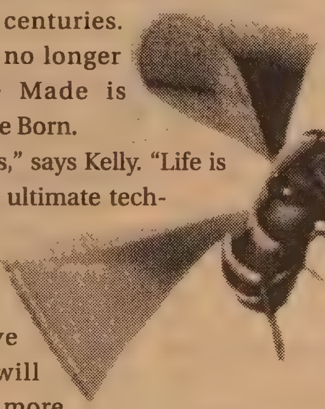
As in the deepest ocean, there are strange things growing in your near future.

Biology and software, robots and currency transactions are flows of information. What began as a common language to discuss transformations has overflowed and allowed these disparate reservoirs to merge into one wild, very high sea.

Kevin Kelly fishes these waters. Editor of *Wired* magazine, former editor of *Whole Earth Review,* on the board of the WELL since its inception, Kevin Kelly

has watched the InfoSea for many years now. In his recent book *Out of Control: The Emergence of Neo-Biological Civilization* (Addison Wesley, ISBN 0-201-57793-3), he takes us out in a glass-bottomed boat to find out what is maturing in the shallows—and the deeps.

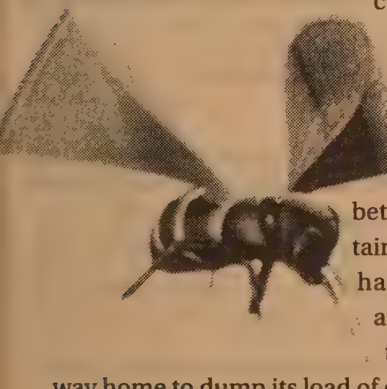
What he sees growing is a convergence. The differentiation between mechanical and biological ways of being—what Kelly calls the "Born" and the "Made"—grew in the eighteenth, nineteenth, and twentieth centuries. But that separation is no longer increasing. Now the Made is increasingly imitating the Born.



"BioLogic always wins," says Kelly. "Life is a technology. Life is the ultimate technology. Machine technology is a temporary surrogate for life technology. As we improve our machines they will become more organic, more biological, more like life, because life is the best technology for living."

Further: "I take the view that life is a nonspiritual, almost mathematical property that can emerge from networklike arrangements of matter."

Kelly pursues two themes throughout his book: Life is a characteristic that arises in all sufficiently complex systems; freely evolving life is the best model for any new life. He illustrates these two themes by what is happening now in the working and living Sea of Information.



For example: At night in the MIT labs, a robot creeps about. It has no central nervous system, no logic system that makes all its decisions. Instead it has a family of reflexes that interact without central control. Is the result chaos? No, the robot finds empty soda cans and collects them. It can distinguish between an empty container and one that still has liquid in it. It can avoid obstacles in its travels. It can find its way home to dump its load of cans.

It is operated by the interaction of its parts. It has no center, no "self." It is a small example of what Kelly calls a "hive mind," a distributed consciousness.

To Kelly, this same distributed mentality is characteristic of the kind of life arising now in the information soup: A 1991 conference in which five thousand people in an auditorium flew a flight-simulator program by voting with waved wands. World economic markets. Fashions.

"The job we have for generating this kind of computer-of-ten-years-hence is to plan so that it doesn't become too unpredictable, too wild. Our ideal is not to make nature, the wild, but to make a garden."

All of them imitate the "flocking behavior" by which birds and fish move in united groups. Simple rules with many voters can produce robust and adaptable swarms. This, says Kelly, is the age of "swarmware." It will replace "clockware," the centralized single-decision-maker systems of the mechanical age.

The same distributed approach is evolving software. Kelly's tour of lifelike systems introduces us to software organisms that develop new sorting procedures for databases, and new kinds of graphic art for painters. They both work by an internal evolution that is consciously modeled on biological development. They have both produced beautiful forms unknown to us before.

"Out of control" is an expression that Kelly found among scientists making autonomous robots. It became the title of his book when he found it as a characteristic of "vivisystems," in protoplasm as well as silicon.

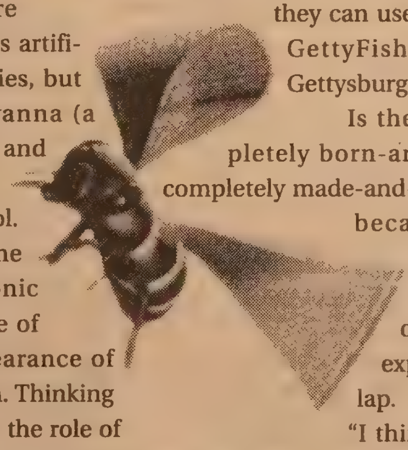
Following his twin themes of life as an inevitability in complex systems, and the free evolution of those forms, Kelly cruises information waters pointing out the results of complexity and autonomy. He takes us to the Midwest where ecologists were attempting to reevolve natural ecologies artificially. They were trying to evolve prairies, but the system wanted to become a savanna (a prairie with trees) so they stood aside and watched it follow its own inclination. The savanna had gone out of control.

Turning to information-in-silicon, he predicts and discusses purely electronic anonymous currencies, the importance of encryption to freedom, and the appearance of "god games" like Populous and SimEarth. Thinking about god games, Kelly points out again the role of liberty for the creature: a god who does not grant freedom to the created will be bored. The creator, as well as the created, needs the creation to be out of control.

If freedom, or "out-of-controlness," makes possible the new, it is the emergence of life in any complex system of sufficient size which sets the stage. Life is an anti-entropic, self-maintaining "vivisystem" that persists and reproduces while patterns around it disintegrate. Does it need to be organic life? By no means, Kelly reminds us: "Of the thousands of computer viruses cataloged by virus hunters so far, not one species of them has gone extinct." Life can be organic, inorganic, or symbiotic.

Symbiosis of mechanism and biology have made possible the pocket planet called the Biosphere. A closed ecology in the Arizona desert with sample life from around the earth, it is possible because electronics and people shore up the works. It is really a living system, with trees and birds and frogs and tiny seas. In certain ways it seems to be artificial, with made-not-born prosthetics like algae scrubbers for its otherwise natural coral reef.

At the other end of the spectrum we find El-Fish. This software program, marketed by Orinda, CA-based Maxis, was created in part by the same Russian who brought us Tetris. It gives the user an electronic aquarium, with lifelike fish and plants moving in the water. It is really electronic and artificial. But its patterns are borrowed from life. The fish and the plants are evolved, not made, from genetic algorithms included with the program. One can design one's own life-forms, or roll the Darwinian dice. Some users have discovered that they can use text files as genotypes: the GettyFish was created using the Gettysburg Address for chromosomes.



Is the Arizona Biosphere completely born-and-not-made? Are El-Fish completely made-and-not-born? These questions, because they cannot be answered, show that the space of life and the space of machine have both expanded, and begun to overlap.

"I think that the network we are creating does share many lifelike attributes, right at this moment," says Kelly. "But many of them are sort of invisible—that's the reason I wrote about them. It's a little hard to see, unless you kind of stand back from it."

Ten years from now, what will a person see to let them know that they're connected to a worldwide organism?

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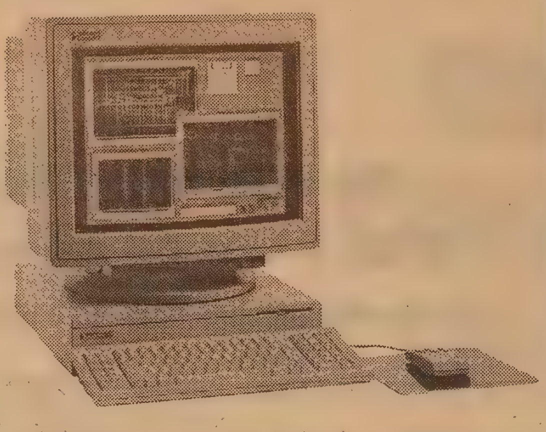

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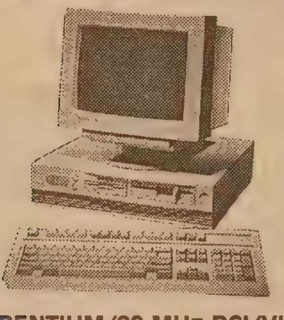

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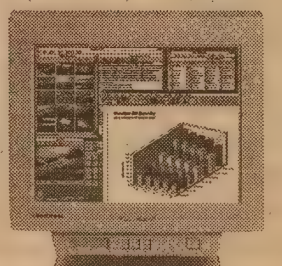

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Even in ten years, I think the sense of its being living will be very subtle. The kind of thing that you should see is that your computer will be a little different each time you turn it on. There will be slight differences.

What humans are about is trying to control or manage those differences so that there is not *too* much, yet there's enough that there's something exciting.

We struggle with upgrading software, and all the kinds of changes which that makes in our computers, each time we load a new system into it. What we might be seeing is something more organic, in the sense that there are small changes over time, rather than these sort of abrupt changes.

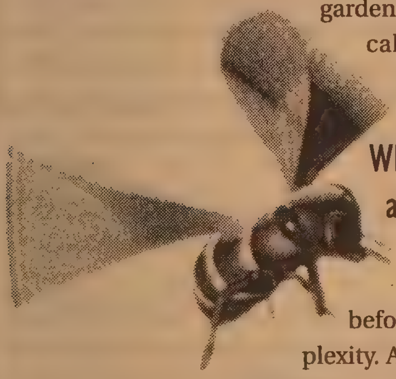
Will the changes be a surprise for the user?

Yes, in the sense that the user has not created them, they will be surprising. Hopefully small surprises. They'll be the kind of surprises that say, "Oh, this runs a little faster," "Oh, here's a little goodie I hadn't seen before" deposited in your computer by something or other.

One of the lifelike aspects that we might see is that there's less of a sense that our computer is an island; rather, it becomes part of a continent. So things happen from the outside, while we're asleep. Perhaps we're selling our CPU cycles and our computer is being used for something. Or there are things that we've said that we're interested in, and they get deposited in our file, our account, our mailbox. Or we're interested in something, and we activate an agent to go out and find something and negotiate for that and bring it back at the right time. Maybe we sent something out long ago and it finally turns up.

So there will be a sense of things working behind the screen, but us not being aware of the kind of productivity, or of the "small minds" behind the screen.

The job we have for generating this kind of computer-of-ten-years-hence is to plan so that it doesn't become too unpredictable, too wild. Our ideal is not to make nature, the wild, but to make a garden. There's unpredictability in a garden, there's the amount we like. But it's not typically wild like the great Yosemite, where anything might happen—wildfires and whatnot.



What has changed to make it possible to have any kind of wildness at all?

Primarily one thing. It was not possible to create artificial wild things before, because we simply did not have the complexity. A required minimum amount of complexity, of environment as well as of the organism, is required before something can take on the attributes of life, including life itself.

The evolution of life required a molecule of certain complexity, to arrange into these basic building blocks of a certain complexity before it could make itself a replicating molecule or something that would have metabolism. And even though mathematically we've shown that these things can be relatively simple, the complexity of even those very simple molecules is still far beyond the kind of machines that we've been making.

This whole new horizon—bringing the kind of wonderment and, really, the power of nature to machines—is all built on the fact that finally we can make machines that are almost as complex as what is found in nature.

There's another side to that story: in our process of making machines more and more complex, we got to the point where we could make them more complex, but we didn't know how to manage them and control them, to use them or to utilize them.

It turns out that really the only way to manage the complexity of these artificial systems is to use what we know as biological principles.

My book is sort of an exploration of what those principles are: What are the basic principles of biology that are not just specific to the instance we have—the "implementation" of it in carbon molecules. What are the general principles of biology that we can use to transfer into machines?

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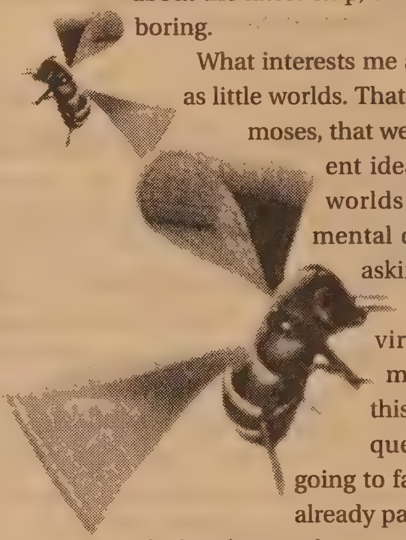
Are you saying, then, that because the level of complexity necessary for life has been reached, and because the only principles that will manage that complexity are biological, that "real, true life" is appearing in machines?

It's a good question, and to me the most exciting one that's being asked these days.

Let me back up and say that, in general, I'm not a technoperson, I don't care about the latest chip, the latest version of software. This is all very boring.



What interests me about computers is that we can use them as little worlds. That we can create small universes, small cosmoses, that we can change very easily and try out different ideas. And the kind of ideas that these little worlds call forth are some of the most fundamental questions that we as humans have been asking.

When you can do something like virtual reality, where you put on a head-mounted display and immerse yourself into this colored polygon world, you begin to ask questions, like, "What *is* Reality?" If you're going to fake reality, or if I somehow or other so far already partially faked it, what is it that's doing that? And what do I need to completely assimilate reality? What is reality at all?

The same kind of question is being asked of life. We make these small models of living systems and begin to say, "Well, this is very lifelike, or somewhat lifelike." What *are* the qualities of life? What is life? And the answers to that range all over the map.

Some people will be very quick to embrace the idea that these are living things because they share some of the qualities. Other people would say, "No, this is obviously not life," so that every time you come up with a list of qualities and the scientists are able to satisfy them, they say, "Whoa! Obviously that list was wrong. We have to add some more, change the list." So it becomes a moving target.

Artificial intelligence is a little like that as well, where the very act of trying to satisfy some initial definitions causes a rethinking, a reexamination of the very problem.

I'm of the bent that life is a process. "Life is a verb," I call it. Life is a dynamic, and it is independent of whatever materials it can be put into. Another way of saying that is that there are probably many kinds of life. We have one example, the stuff outside the window here.

Part of the problem with talking about life is that most of our experience is based on an example of one. It's very, very hard to generalize about one thing. What artificial life in computers and other mechanical systems is showing is that life is probably a very big, broad class of things. There are probably lifelike systems in other arenas such as computers or robots. I call these things "vivisystems" to try to get away from the idea of life...

A "vivisystem" is any kind of a system that shares some of the qualities of living systems. So that it self-replicates, it has metabolism, it has emergent governance that's in itself, it's self-stabilizing.

I don't claim that's an exclusive list, or that you have to necessarily have all these qualities. I mean the Michelangelo computer virus and the AIDS virus are both members. It's a general class of systems of which the SimEarth simulation and the Gaia outside our window, the earth as a whole system, are both members. These are very large self-sustaining, self-correcting systems.

Is it fair to say that corporations, and many of the programs that run on computers, already share many of the characteristics of life the way you define it?

continued on page 328

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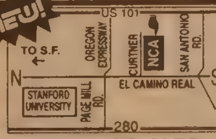

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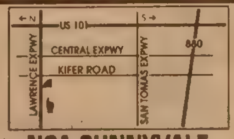

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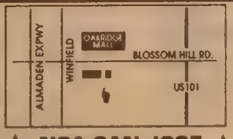

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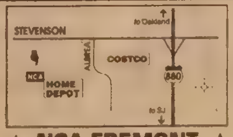

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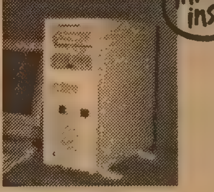

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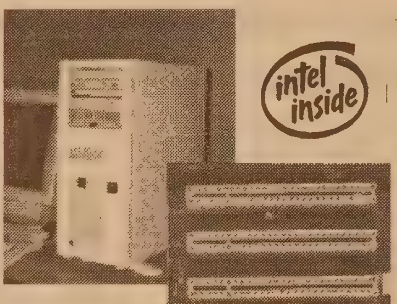

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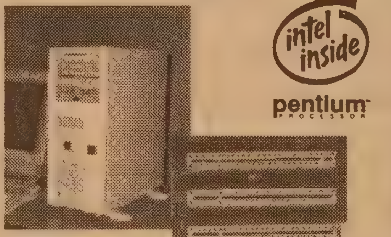

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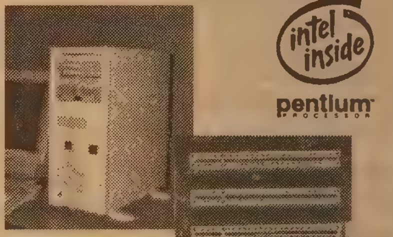

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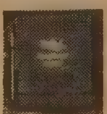

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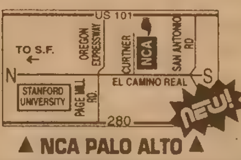

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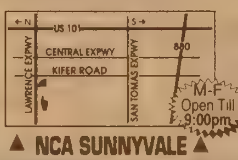

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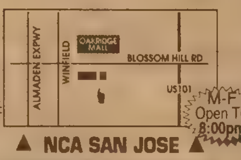

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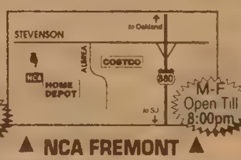

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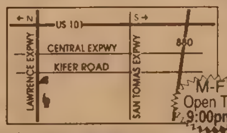
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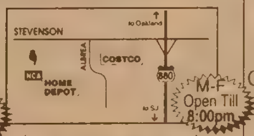
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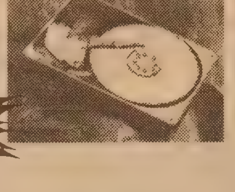
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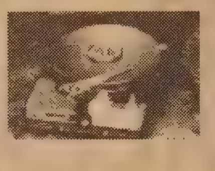
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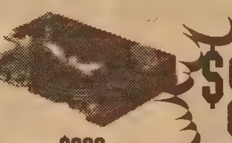

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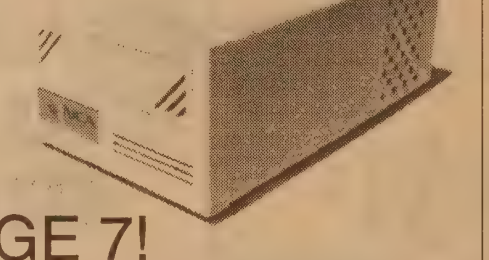

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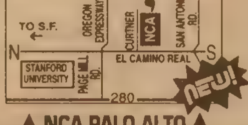

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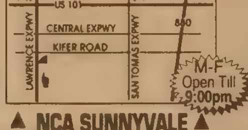

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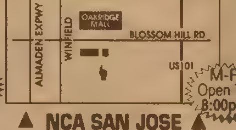

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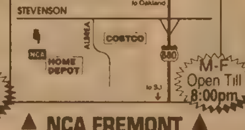

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CAPACITY	M/N	SPEED	SIZE	PRICE
270MB IDE	QM30270MVA	12ms	3.5"X1"	$199
540MB IDE	QM30540MVA	12ms	3.5"X1"	$259
270MB SCSI	QM30270MVS	12ms	3.5"X1"	$209
540MB SCSI	QM30540MVS	12ms	3.5"X1"	$269

LIGHTENING SERIES

CAPACITY	M/N	SPEED	SIZE	PRICE
540MB IDE	QM3054LTA	12ms	3.5"X1"	$279
540MB SCSI	QM30540LTS	12ms	3.5"X1"	$299
730MB IDE	QM30730LTA	12ms	3.5"X1"	$399
730MB SCSI	QM30730LTS	12ms	3.5"X1"	$409

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CAPACITY	M/N		SPEED	SIZE	PRICE
256MB	GLS256AT		17ms	2.5"X19mm	$339
514MB	QM20514		14ms	2.5"X19mm	$499
170MB	ELS170A	32K	17ms	3.5X1"	169
210MB	LPS210A	32K	17ms	3.5"X1"	$169
270MB	**LPS270A**	**128K**	**12ms**	**3.5X1"**	**$189**
365MB	**QM30365A**	**64K**	**12ms**	**3.5X1"**	**$199**
540MB	**LPS540AT**	**128K**	**12ms**	**3.5X1"**	**$259**

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FOR MAC POWERBOOKS

CAPACITY	M/N	SPEED	SIZE	PRICE
160MB	GRS160S	17ms	2.5" X17mm	$259

CAPACITY	M/N	CACHE	SPEED	SIZE	INTERNAL	EXTERNAL
170MB	ELS170S	32K	17ms	3.5X1"	$179	$279
540MB	LPS540S	128K	12ms	3.5"X1"	$269	$369
540MB	EMPIRE	512K	9.5MS	3.5"X1"	$499	$629
1.0GB	PD1080S	512K	9.5ms	3.5"X1"	$599	$699
1.4GB	1400S	512K	8.9ms	3.5"X1"	$829	$929
2.1GB	**EMPIRE**	**512K**	**8.9ms**	**3.5"**	**$1129**	**$1229**

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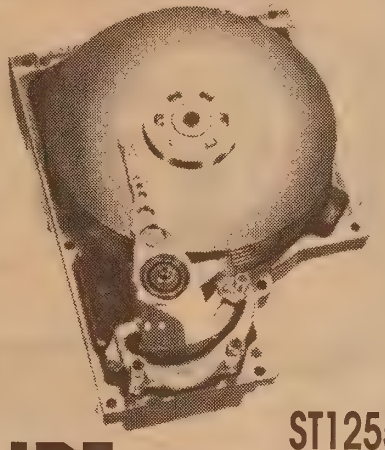

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ST12550N

- ▶ 3.5", 8ms
- ▶ 7200RPM
- ▶ Fast SCSI-II
- ▶ 500,000MTBF

INTERNAL $1259

EXTERNAL $1359

BARRACUDA 2LP Low Profile...$1399

BARRACUDA IV / 4.1GB

ST15150N

- ▶ 3.5", 8ms
- ▶ 7200RPM
- ▶ Fast SCSI-II
- ▶ 500,000MTBF

INTERNAL $2399

EXTERNAL $2499

ST12550W Fast Wide SCSI-II....$1499

IDE

CAPACITY	M/N	CACHE	SPEED	SIZE	PRICE
210MB	ST3243A	---	16ms	3.5"x1"	$189
341MB	ST3391A	120K	13ms	3.5X1"	$249
545MB	ST3655A	256K	12ms	3.5X1"	$399
130MB	*ST9145AG*	*64K*	*16ms*	*2.5" NOTEBOOK*	*$259*
209MB	*ST9235AG*	*64K*	*16ms*	*2.5" NOTEBOOK*	*$339*
340MB	*ST9385AG*	*64K*	*16ms*	*2.5" NOTEBOOK*	*$469*

SCSI

CAPACITY	M/N	CACHE	SPEED	SIZE	INTERNAL	EXTERNAL
456MB	ST3550N	256K	12ms	3.5X1"	$339	$449
1.0GB	**ST31200N**	**256K**	**9ms**	**3.5"x1"**	**$679**	**$779**
1.6GB	ST11950N	1024K	8ms	3.5"	$1249	$1359
2.1GB	ST12400N	256K	9ms	3.5"	$1099	$1199
2.1GB	ST12550N	1024K	8ms	3.5"	$1259	$1359
2.9GB	ST43400N	512K	10ms	FH	$1959	$2169
2.9GB	ST43401N	512K	10ms	5.25	$2099	$2299
4.1GB	ST15150N	7200RPM	8ms	3.5"	$2399	$2499
4.3GB	ST15230N	7200RPM	8ms	3.5	$1999	$2099
9.0GB	ST410800N	1024K	11.5ms	5.25	$3899	$4099

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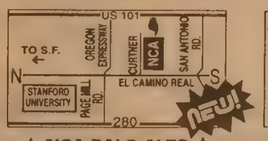
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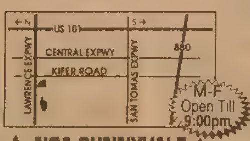
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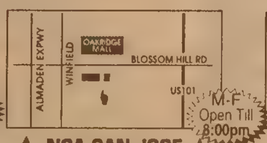
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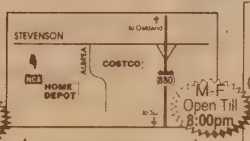
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- MC2217S/A
- 10ms Seek Time
- 5400RPM
- 3.5"

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	MODEL	RPM	SPEED	SIZE	INTERNAL
1.05GB	MC4110A	5400	8.5ms	3.5"	$579
1.75GB	MC2217A	5400	10ms	3.5"	$879

SCSI

	MODEL	RPM	SPEED	SIZE	INTERNAL	EXTERNAL
1.0GB	MC2210AV	Audio/Visual			$699	$799
1.0GB	MC4110	5400	8.5ms	3.5"X1"	$579	$679
1.75GB	MC2217	5400	10ms	3.5"	$879	$979
1.75GB	MC2217AV	Audio/Visual			$1049	$1149
1.75GB	MC2217DW Fast Wide Differential				$1299	$N/A
2.0GB	MC42215	5400	8.5msl	3.5" X 1"	$1499	$1599
3.0GB	MC1936	5400	11ms	FH	$1799	$1899
3.0GB	MC1936AV	Audio/Visual			$1899	$1999
4.0GB	MC3143S	5400	8.5ms	3.5" X 1"	$2999	$3099
9.1GB	MC1991	5400	10msl	5.25" X 1"	$3899	$4099

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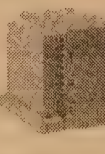

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- 5-Yr. Warr.
- 57 Mbits/s Trans. Rate
- Up to 10Megabytes/s (synchronous)

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- HP C3323A
- 10.5ms Seek Time
- 5400RPM
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- 5-Yr. Warr.
- Up to 24 Mbits/s Trans. Rate
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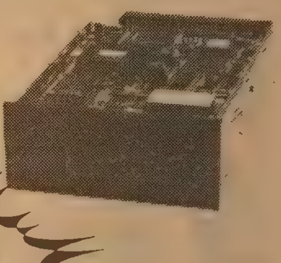

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- 10ms Seek Time
- 256K Read/Write Cache(SCSI)
- 5-Year Warranty

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SCSI

CAPACITY	M/N	CACHE	SPEED	SIZE	INTERNAL	EXTERNAL
240MB	M2637SA	Notebook	11ms	3.5"	$349	N/A
530MB	M2684SA*STATE OF THE ART*				$299	$399
1.0GB	M2694ESA	256K	10ms	3.5"	$579	$879

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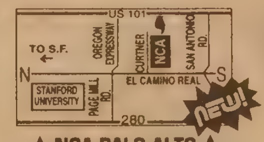

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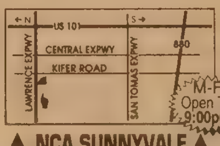

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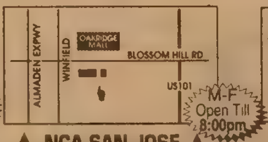

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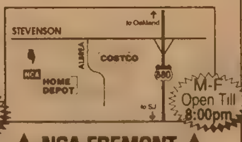

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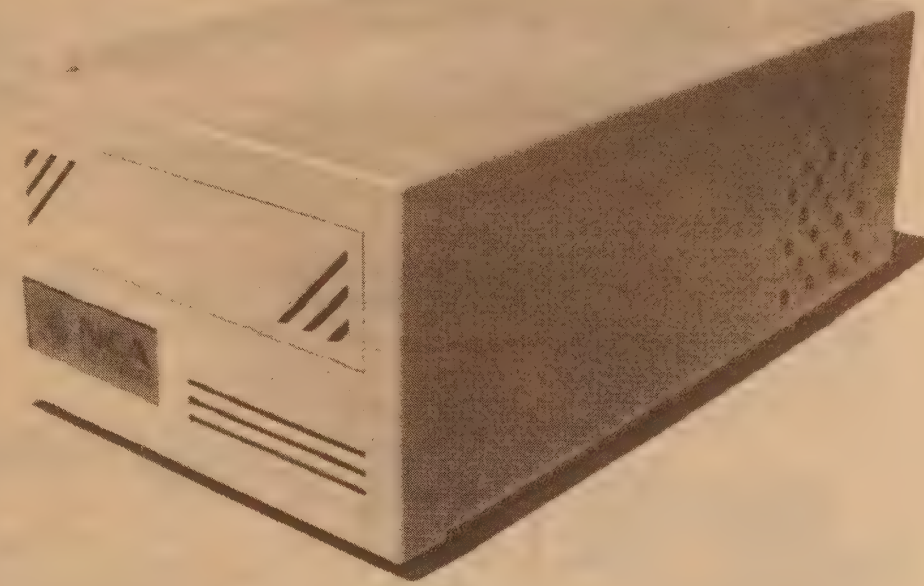

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3.5" Fixed SCSI Disk Drives

SIZE	Int. Drive	SPEED	WARRANTY	PRICE
Formatted				
170Mb	Quantum	17ms	2Yr	$279
270Mb	Quantum Maverick	12ms	2Yr	$319
290Mb	Maxtor	14ms	2Yr	$339
340Mb	Conner		2Yr	$329
345Mb	Maxtor	15ms	2Yr	$359
456Mb	Seagate	10ms	1Yr	$449
530Mb	Fujitsu	State of the Art	5Yr	$399
540Mb	Quantum Empire	9.5ms	2Yr	$629
540Mb	Quantum Maverick	12ms	2Yr	$379
540Mb	Quantum Lightening	12ms	2Yr	$409
540Mb	Maxtor	8.5ms	2Yr	$459
540Mb	Conner	12ms	1Yr	$399
730Mb	Quantum Lightening	12ms	2Yr	$519
1.0Gb	Quantum	9.5ms	5Yr	$699
1.0Gb	Conner	<10ms	1Yr	$689
1.0Gb	Micropolis	8.5ms	5Yr	$679
1.0Gb	IBM	8.6ms	5Yr	$749
1.0Gb	Seagate	9ms	5Yr	$779
1.0Gb	DEC 3107	9ms	5Yr	$799
1.0Gb	Fujitsu	10ms	5Yr	$689
1.05Gb	HP	10.5ms	5Yr	$779
1.4Gb	Quantum	8.9ms	5Yr	$929
1.6Gb	DEC	9ms	5Yr	$999
1.75Gb	Micropolis	10ms	5Yr	$979
2.0Gb	IBM	8.6ms	5Yr	$1259
2.1Gb	Seagate	9ms	5Yr	$1199
2.1Gb	HP	8.9ms	5Yr	$1299
2.1Gb	DEC	9.5ms	5Yr	$1379
2.1Gb	Quantum Empire	8.9ms	5Yr	$1229
2.1Gb	Seagate	8ms	5Yr	$1359
4.0Gb	Micropolis	8.5ms	5Yr	$3099
4.1Gb	Seagate Barracuda	8ms	5Yr	$2499
4.3Gb	Seagate	8ms	5Yr	$2099

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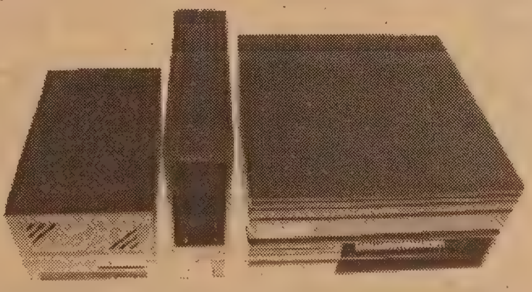
Barracuda II

External
FH Fixed SCSI Disk Drives

SIZE	Int. Drive	SPEED	WARRANTY	PRICE
Formatted				
2.0Gb	Micropolis	8.5ms	5Yr	$1599
2.9Gb	Seagate 43400N	10ms	5Yr	$2169
2.9Gb	Seagate 43401N	10ms	5Yr	$2299
3.0Gb	Micropolis 1936	11ms	5Yr	$1899
3.5Gb	DEC	11.5ms	5Yr	$2199
4.0Gb	IBM	11ms	5Yr	$2599
9.0Gb	Seagate	11.5ms	5Yr	$4099
9.1Gb	Micropolis	10msl	5Yr	$4099



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Barracuda III

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SIZE(UPTO)	MAKE	MODEL	TYPE	PRICE
250Mb	WangTek	5150ES	1/4"	$499
250Mb	Connor Viper	2150S	1/4"	$424
525Mb	Conner Viper	2155S	1/4"	$559
525Mb	WangTek	E5525S	1/4"	$649
1.3Gb	Connor Anaconda	2750	1/4"	$899
1.5Gb	Exabyte	FS1G		$898
2.5Gb	Exabyte	EXB8205	8mm	$1599
5.0Gb	Exabyte	EXB8500	8mm	$2599
5.0Gb	Exabyte	EXB8505	8mm	$2499
2.0Gb	HP	35470	4mm	$899
2.0Gb	Connor Python	4320NT	4mm	$899
2.0Gb	WangDat	3100	4mm	$949
4.0Gb	Connor Python	4324	4mm	$999
5.0Gb	Exabyte	EXB4200C	4mm	$1039
5.0Gb	HP		4mm	$1029
4-8.0Gb	HP	35480	4mm	$999
4-8.0Gb	WangDat	3200	4mm	$999
4-8.0Gb	WangDat	3400Dx	4mm	$1099
4-16.0Gb	HP		4mm	$1199

MAC Backup Software	*add $ 79*
NovaBack for PC or WIN	*add $ 99*
Novell NLM for 250users	*add $449*

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MAKE	MODEL	ACCESS	TRANSFER	PRICE
TOSHIBA	3401B	200ms	330Kb	$359
TOSHIBA	3501B			$519
NEC	3Xe	190ms	450Kb	$459
NEC	3Xi	190ms	450kb	$529
NEC	3Xp	240ms	450kb	$379
NEC	4X PRO	180ms	600kb	$639
Plextor	5028	240ms	330Kb	$359
Plextor	3028	240ms	330kb	$379
Plextor	Quad-SPeed		600kb	$569
PIONEER	602X	300ms	307Kb	$439
PIONEER	604X	300ms	612Kb	$969
PIONEER	1804	300ms	614Kb	$1899
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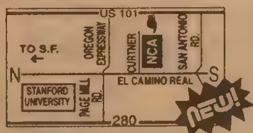

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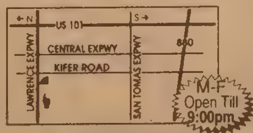

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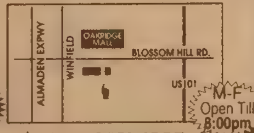

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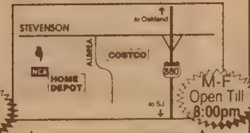

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TAPE BACK-UP

MORE

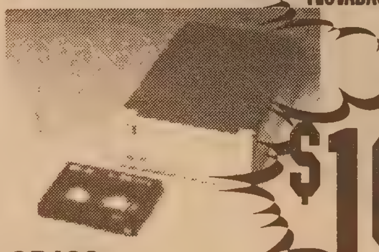
HEWLETT PACKARD

The most reliable SCSI Tape Backups for MAC, PC or SUN

5GB *External* 4mm 3.5" SCSI DAT TAPE BACKUP

- 732 Kbytes/Sec Transfer Rate (Sustained)
- 5 MB/ Sec (Synchronous)

INCLUDES: 1 CARTRIDGE & NOVABACK BACKUP SOFTWARE



$1029

35480

SCSI 4mm DAT

CAPACITY	MODEL	INTERNAL	EXTERNAL
2.0GB	35470 DAT	$799	$899
4-8GB	35480 DAT	$889	$999
4-16GB	C1533A	$1099	$1199

CONNER *The BEST name in SCSI Back-up Drives*

SOF•STOR

for IBM Compatibles, MAC, SUN, & NeXT

Formerly ARCHIVE

SCSI

- ◆ 36MB/MIN
- ◆ SCSI-2
- ◆ 1/4" TAPE UNIT

ANACONDA

1.3GB 2750
INTERNAL $799
EXTERNAL $899

VIPER

- ◆ 6MB/MIN
- ◆ SCSI
- ◆ 1/4" TAPE UNIT

250 MB 2150S	525 MB 2525S
INTERNAL $317	INTERNAL $459
EXTERNAL $424	EXTERNAL $559
Int. W/Software $399	Int. W/Software $549

PYTHON

SCSI 4mm DAT Tape Backups

- ◆ 11MB/MIN.
- ◆ 1MB Cache Buffer

2 GB. 4320 NT	4 GB. 4324 TURBO
INTERNAL $799	INTERNAL $899
EXTERNAL $899	EXTERNAL $999

COLORADO MEMORY SYSTEMS INC.

Uses 2120 Tapes

RUNS OFF FLOPPY PORT

CAPACITY	MODEL/TYPE	INTERNAL
120MB	DJ10 JUMBO120	$99
250MB	DJ20 JUMBO250	$159

EXTERNAL KIT WITH CARD AND CABLES KE-10	$109
EXTERNAL TAPE PORT AB-11	$35
FC-10 TAPE CONTROLLER, WITH CABLES	$78
TC-15 HIGH PERFORMANCE 16-BIT CONTROLLER	$168

WangDAT™

4-8GB

Internal $999

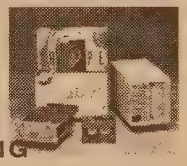
3400DX DAT Tape Backup

External $1099

SCSI 4mm DAT

CAPACITY	MODEL	INTERNAL	EXTERNAL
2.0GB	3100 DAT	$849	$949
4-8GB	3200 DAT	$899	$999

EXABYTE®



FS1G

1.5 GB SCSI Tape Storage

COMPLETE SYTEM INCLUDES:

- Internal FS1G Tape Drive
- Adaptec 16-Bit SCSI Controller Card
- File Secure Software
- Up to 30 MB/Min. Transfer Rate
- One Data Cartridge

$729

External FS1G Kit...$898
Internal Unit (2501) $519

4mm DAT Cartridge

CAPACITY	MODEL	INTERNAL	EXTERNAL
5GB	EXB-4200C	$949	$1039

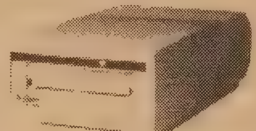
2.5 GB 8mm DAT Subsystem

CAPACITY	MODEL	INTERNAL	EXTERNAL
2.5GB	EXB-8205	$1349	$1599

5 GB 8mm DAT Subsystem

CAPACITY	MODEL	INTERNAL	EXTERNAL
5.0GB	EXB-8505	$2069	$2499
5.0GB	EXB-8500	$2299	$2599

Trakker



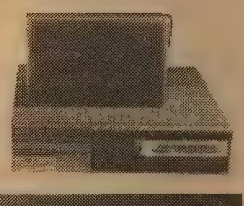
PARALLEL PRINTER PORT EXTERNAL TAPE BACK-UP SYSTEMS

RUNS OFF PARALLEL PRINTER PORT

CAPACITY	MODEL/TYPE	EXTERNAL
120MB	TRAKKER 120	$279
250MB	TRAKKER 250	$317

POWERTAPE 2GB $1099
2GB External Tape Backup system

WANGTEK



SCSI Tape

CAPACITY	MODEL	INTERNAL	EXTERNAL
250MB	5150S	$399	$499
525MB	5525S	$539	$649

CONNER

TAPE•STOR 250MB

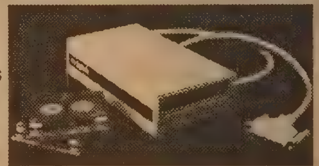
TAPE BACKUP
INCLUDES 1 CARTRIDGE

INTERNAL	EXTERNAL
RUNS OFF FLOPPY PORT	RUNS OFF PARALLEL PORT
$149	$299

backpack

Tape Drive

Parallel Port 250MB External Tape Backup



- ▶ QIC 80 uses 2120 tapes
- ▶ Software for unattended backups
- ▶ Twice as fast as internal floppy drive
- ▶ Window and DOS Software Included
- ▶ 2 Year Warranty

$339

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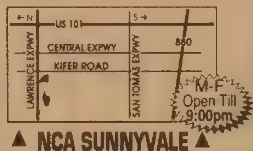

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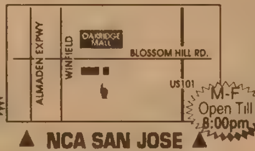

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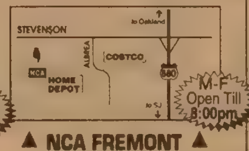

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QUALITY BRAND NAME PRODUCTS

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SUMMIT EXPRESS™SE250

250MB 3.5" MINI-CARTRIDGE

INTERNAL TAPE BACKUP SYSTEM

SUPER FEATURES:
- 3.5MB per minute w/comp.
- Uses DC-2120 tapes
- Easy installation & use
- 100% QIC 80 compatible
- System & Network compatible
- Includes Filesafe First software

$149

SUMMIT EXPRESS™SE305

305MB 3.5" MINI-CARTRIDGE

INTERNAL TAPE BACKUP SYSTEM

NEW!

SUPER FEATURES:
- 305MB on a single DC2150
- 10MB per minute w/comp.
- Uses DC-2120 tapes
- Format on the Fly
- Easy installation & use
- 100% QIC 80 compatible
- System & Network compatible
- Includes SummitSafe software

$199

FILESAFE 1200 PLUS DIGITAL SCSI-II AUDIO TAPE SUBSYSTEM

4mm DAT Tape Backup

SUPER FEATURES:
- 10MB per minute w/comp.
- Includes SCSI interface, DAT cartridge, cables & more...
- Quick file access
- Advanced error control
- System & Network compatible
- Includes FileSafe software

INTERNAL

$1359

EXTERNAL........$1499

FS-TD-250 FILESAFE FIRST FOR WINDOWS....$199

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Affordable High Performance SCSI Controllers

Fast!SCSI™ EISA

- Patented 400 Series high-speed SCSI Processor
- 10MB per second fast SCSI-II
- Free CorelSCSI for CD-ROM and HDD included
- Comprehensive software support
- 50-pin internal SCSI Cable provided with support for up to three internal drives
- 5-Year Warranty

FAST!SCSI EISA FL
With Floppy Connector....$199

$179

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- Patented 400 Series high-speed SCSI Processor
- 16-bit PIO Data Transfer>3MB/Sec.
- Free CorelSCSI for CD-ROM and HDD included
- Comprehensive software support
- 50-pin internal SCSI cable provided
- Supports up to 7 SCSI devices
- 5-Year Warranty

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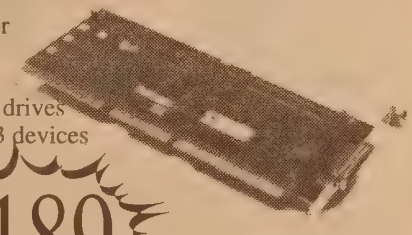

- Patented 400 Series high-speed SCSI Processor
- Supports 33MHz & 50MHz
- 32-bit VLB Host Data Transfer
- Free CorelSCSI for CD-ROM and Winchester drives
- 50-pin internal SCSI cable provided for up to 3 devices
- Comprehensive software support
- **FLOOPY CONNECTOR, SUPPORTS 2 FLOPPY DRIVES**
- Supports up to 7 SCSI devices
- 5-Year Warranty

$189

Fast!SCSI™ IQ PCI

- 12Mips RISC SCSI Processor
- Bus Master
- Support Fast & Wide SCSI-II
- 4000 IO/Sec. Throughput
- Corel SCSI Ver. 2 with Netware Support
- Full Software Driver Support

$289

Fast!SCSI™ PCMCIA

- Patented 400 Series high-speed SCSI Processor
- 16-bit PIO Data Transfer>3MB/Sec.
- Free CorelSCSI for CD-ROM and Hard Drive
- Occupies a single PCMCIA slot
- Comprehensive software support
- Supports up to 7 SCSI devices
- 5-Year Warranty

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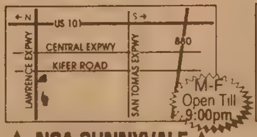

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SCSI CONTROLLERS

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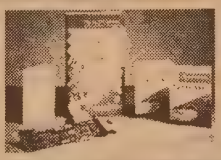


SCSI CONTROLLERS

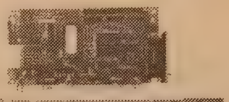
MODEL	DESCRIPTION	PRICE
1505	TOTAL CD 16-BIT SCSI-II	$49
1510	CD ROM 16-BIT -SCSI CARD KIT	$89
1522	16-BIT 7HD/2FD KIT	$139
1542CF	BUS MASTER COMPLETE KIT	$249
1542C+	BUS MASTER KIT WITH COREL SCSI	$314
1640	MICROCHANNEL FOR PS/2, 7HD	$299
2742	**EISA KIT, 14HDS**	**$359**
2742W	Fast Wide SCSI EISA	$379
2842A	**Fast SCSI-II VESA**	**$259**
APA-460	Slim SCSI PCMCIA SCSI Card	$289
AHA-2940	PCI SCSI MASTER RISC-BASED I/O	$279
AHA-2940W	PCI FAST-WIDE SCSI	$359
AMM-1570	**FULL SCSI WITH ADVANCED AUDIO**	**$319**

DATA TECHNOLOGY
CORPORATION

SCSI CONTROLLERS

MODEL	DESCRIPTION	PRICE
DTC3270VL	32-Bit VESA 7SCSI/2FD SCSI	$119
DTC 3280AS	16-Bit ISA to SCSI Host Adapter	$104
DTC3280AS	EISA to SCSI 32-Bit Host w/Cache	$499

American Megatrends



SCSI CONTROLLERS

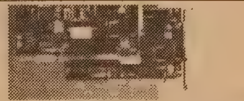
DESCRIPTION	PRICE
FastDisk NC EISA non-cache SCSI cont.	$295
FastDisk EISA Caching Controller up to 16MB	$389
FastDisk VLB VESA Local Bus Caching Controller	$393
FastLAN SCSI	$439

PROMISE TECHNOLOGY,INC.

SCSI CONTROLLERS

MODEL	DESCRIPTION	PRICE
DC-440	VLB SCSI-2 BUS MASTER w/ IDE Interface	$199

TRANTOR



FULL KITS W/DRIVERS FOR CD-ROM/OPTICAL... ETC.

SCSI CONTROLLERS

MODEL	DESCRIPTION	PRICE
T228	MICROCHANNEL, 7HD	$139
T338	PARALLEL PORT to SCSI ADAPTER	$99
T348	PARALLEL PORT to SCSI PLUS	$149
T358	Parallel Port to SCSI Plus Enhanced	$189

TRANTOR SCSI Works
ASPI Device Drivers For: **$49**
CD-ROMs, Photo CD, Tape Drives, Syquest, Opticals, Scanners, Hard Drives
TAPEMATE II Back-up software & Music Box-Audio CD Software

aaa always technology

Easiest to use, PLUG & PLAY with CD Drivers

SCSI CONTROLLERS

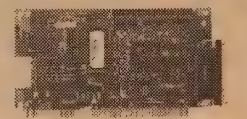
MODEL	DESCRIPTION	PRICE
IN2000	16 BIT 7HD/2FD "Easiest to use"	$175
IN2000PRO	With COREL SCSI	$215
AL1000	SCSI To PARALLEL	$159
AL1000PRO	Above With COREL SCSI	$185

TekrAm

Enhanced IDE PCI

MODEL	DESCRIPTION	PRICE
	Enhanced PCI IDE CONTROLLER	$39

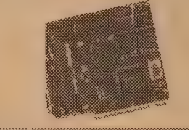
FUTURE DOMAIN



SCSI CONTROLLERS

MODEL	DESCRIPTION	PRICE
TMC850	8-BIT W/BIOS	$59
TMC1670	SVP 16-BIT SCSI VALUE PACK	$149
TMC1680	SVP 16-BIT VALUE PACK 7HD/4FD	$139
SCSI2GO	PCMCIA FAST SCSI-II TYPE II	$279

Acculogic



SCSI CONTROLLERS

MODEL	DESCRIPTION	PRICE
20	PCI SCSI Host Adapter, Sup. Wide SCSI-3	$219
40	PCI SCSI Host Adapter, Corel SCSI. Wide SCSI-3	$219

BUSLOGIC

SCSI CONTROLLERS

MODEL	DESCRIPTION	PRICE
BT545S	ISA Bus Master Fast SCSI Adapter Kit	$208
BT445S	**Bus Master Fast SCSI Kit for VL Bus**	**$199**
BT742A	EISA Bus Master SCSI-II Adapter Kit	$329
BT747S	EISA Bus Master Fast SCSI	$364
BT757S	FASTWIDE SCSI CARD	$369
BT946C	Bus Master Fast SCSI for PCI Local Bus	$239

ADVANSYS.

SCSI-2 VL BUS MASTER

- 32-bit, 120MB/sec. burst mode • 10MB/sec. synchronous on Fast SCSI
- SCSI II, Bus Master DMA

SCSI CONTROLLERS

AdvanSCSI *Gold Network* Kit

- ABP-842 VL to SCSI 2 host adapter with floppy controller
- AdvanWare configuration/installation software
- **COREL SCSI Network manager**
- NOVELL NetWare Utilities for RAID 4 & 5
- Internal ribbon cable, VHS video installation guide
- User's manual

$369

AdvanSCSI *Silver Multi-Media* Kit

- ABP-842 VL to SCSI 2 host adapter with floppy controller
- AdvanWare configuration/installation software
- **COREL SCSI Version 2**
- Internal ribbon cable, VHS video installation guide
- User's manual

$229

IDE CONTROLLERS

NCA'S STANDARD IDE

IDE CONTROLLERS

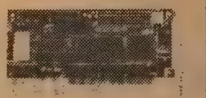
MODEL	DESCRIPTION	PRICE
200	2HD/2FD CONTROLLER W/CABLES	$14
211	2HD/2FD W/2 SERIAL, 1PAR, 1GAME	$23
NCL53	SMART CONT. W/BIOS EASY INSTALL	$49
223	**2HD/2FD for VESA LOCAL BUS I/O**	**$59**

BUSLOGIC

IDE CONTROLLERS

MODEL	DESCRIPTION	PRICE
BT510A	IDE Cache Contoller For PC/AT Sys.	$89
BT410A	IDE Cache Controller for VLB	$129
BT910A	IDE PCI Cache Controller	$169

PROMISE TECHNOLOGY,INC.



IDE CACHING CONTROLLERS

IDE CONTROLLERS

MODEL	DESCRIPTION	PRICE
DC-200	ISA IDE 4HD/2FD, 2.88MB FLOPPY SUPPORT	$89
DC-420VLB	VESA IDE 512K CACHE	$99
DC-4030VL-2	VESA IDE 2.88MB SUPPORT 4HD/2FD	$109
DC-200M	ISA IDE 512K CACHE 4HD/2FD 2.88 SUPPORT	$99
DC2032	ISA Caching Controller	$139

IDE CONTROLLERS

gsi

DESCRIPTION	PRICE
GSI Model 11 8-bit Four FDD & TAPE ACC. CARD	$79
GSI Model 18 16-bit Primary or Secondary IDE	$49
GSI Model 21 16-bit IDE Accelerator Brd	$59
GSI Model 32 16-bit MULTI-PORT IDE I/O ACC.	$129
GSI Model 4C 16-bit Four Channel, Eight-IDE	$149

DATA TECHNOLOGY
CORPORATION

IDE CONTROLLERS

MODEL	DESCRIPTION	PRICE
DTC 2278AS	VESA Multi I/O 2s/1p/1g	$39
DTC2277VLL	VESA Caching IDE Controller	$149
DTC 2280	16-Bit Super I/O 2FD/2HD 2s/1p/1g	$19.99

WONDER 16550 IDE CARD

2 IDE DRIVES/2 FLOPPY
2 HIGH SPEED 16550 SERIAL PORTS
1 PARALLEL PORT / 1 GAME
$69

16650 I/O Controller......$45

PORT-FOLIO 16550

13-Port Super I/O Card
4 INTEGRATED NS16550 HIGH SPEED UARTs

- 2 IDE HD • 4 Floppy
- 2 Parallel • 4 Serial
- 1 Game

QUICKPATH

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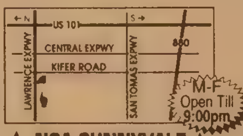

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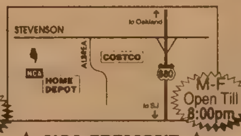

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- ▶Approx. 40ms

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EXTERNAL SCSI 230MB, 3.5" REWRITABLE OPTICAL

- ▶ External Optical Drive
- ▶ Using 2512 Internal
- ▶ Includes 1 Cartridge
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- ▶ 3600RPM
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INTERNAL 230MB, 3.5" REWRITABLE OPTICAL

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- ▶ 2512
- ▶ Low Profile, Only 1"
- ▶ 3600RPM
- ▶ 256K Cache
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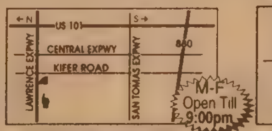

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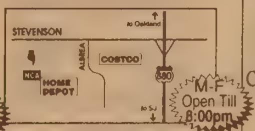

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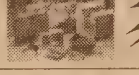

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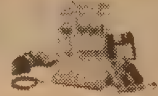
SuperQuad 4X



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- Includes:
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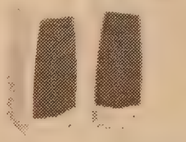

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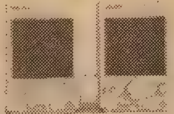

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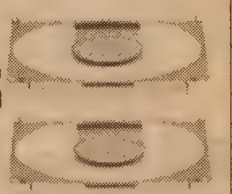

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SCSI CD ROMs

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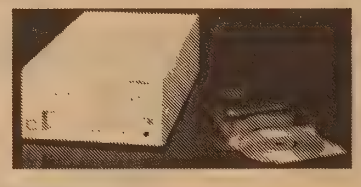

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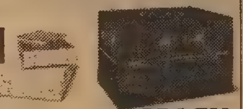

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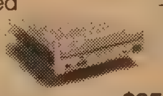

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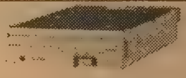

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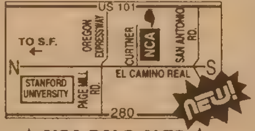

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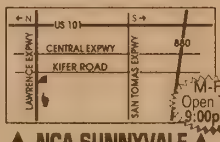

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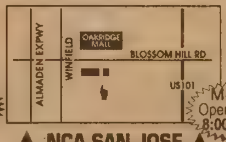

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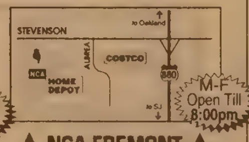

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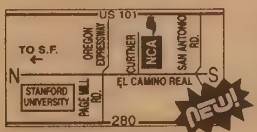

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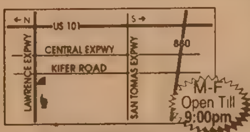

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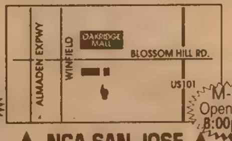

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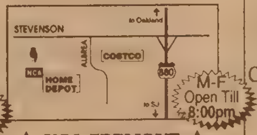

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MULTIMEDIA

YAMAHA

YAMAHA POWERED MONITOR SPEAKERS

NEW!

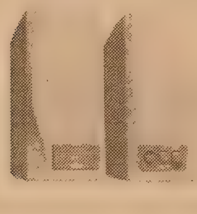
YST-M5

- 3 Watts per channel
- Video Shielded
- Active Servo Technology delivers Life-Like sound
- 90Hz-20KHz ± 3dB
- Includes AC Adapter

$69

YST-M10

- 10 Watts per channel
- Video Shielded
- Active Servo Technology delivers Life-Like sound
- 80Hz-20KHz ± 3dB
- Includes AC Adapter
- 4 Star Rating "MACWorld April 1994"



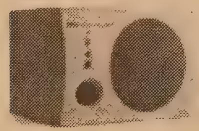
$89

YAMAHA POWERED SUBWOOFER

NEW!

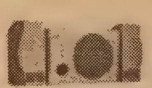
YST-MSW10

- 25 Watts
- Video Shielded
- Auto On/Off Switching
- Active Servo Technology delivers Life-Like sound
- 35Hz-250KHz ± 10dB



$179

SPEAKER BUNDLES:



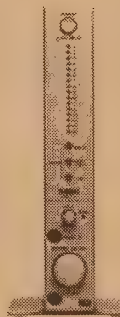
YST-SS1010 includes YST-M10 speakers & Subwoofer...$249
YST-SS510 includes YST-M5 speakers & Subwoofer.......$219

YAMAHA EXTERNAL MIDI SOUND CARD

CBX-T3

PC or MAC

- Advanced Wave Memory
- 192 Instrument & Effect Voices
- 10 Different Drum & Percussion Sets
- Connects Via Serial Port on MIDI Port
- Available for PC or MAC
- Includes Passport Trax™ MIDI Player SoftwareBundle
- "Best Synthesizer" Multi-Media World



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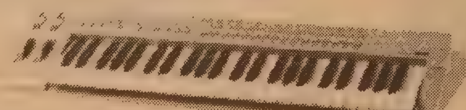
YAMAHA MIDI-CONTROLLER PIANO KEYBOARD

K-3



- Professional Quality Keyboard
- Velocity Sensitive
- Pitch Bend Wheel
- Modulation Wheel
- Operates Sound Cards with MIDI Port

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- Stereo Speakers
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Sound Blaster Pro Value Edition	$79
Sound Blaster 16 Basic Value Edition	$99
Sound Blaster 16 MultiCD/with ASP	$129/165
Wave Blaster	$169
Sound Blaster AWE32 VALUE EDITION	$229
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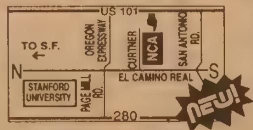

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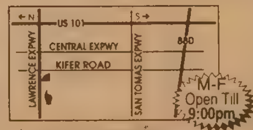

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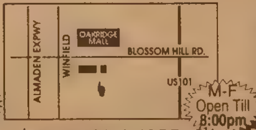

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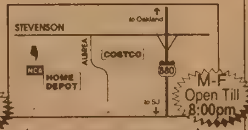

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•14", .28mm
•1024X768
•Non-Interlaced
•Flat Screen

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3V

•15", .28mm
•1024X768
•Non-Interlaced
•Flat Screen

$489

3FGe

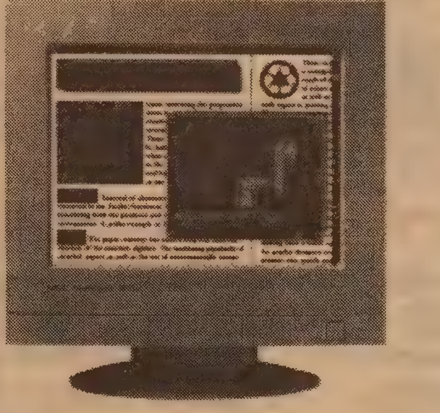
•15", .28mm
•1024X768
•XGA-2 Compatible

$549

4FGe

•15", .28mm
•1024X768
•Anti-Static
•Flat Screen

$629



5FGe

•17", .28mm
•1024X768
•76Hz Refresh

$989

5FGp

•17", .28mm
•1280X1024
•Opticlear

$1099

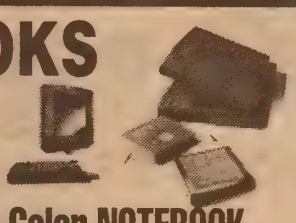
6FGp

•21", .28mm
•1280X1024
•Opticlear

$1989

NOTEBOOKS

NEC



VERSA E75 Active Color NOTEBOOK

486DX2/75MHz 340MB/4MB RAM

•SL Enhanced i486™ DX2
•8Kb Cache
•Built-in Numeric Co-Processor
•4MB RAM (exp. to 20MB)
•2 PCMCIA Slots
•TFT Active-Matrix Color Screen
•User Removable/Reversable Screen
•MS-DOS, Windows Preloaded
•3 Yr. Warranty

LOWEST PRICE GUARANTEE*

CALL FOR VERSA Active Color SUB-NOTEBOOK

LOWEST PRICE GUARANTEED ON ALL YOUR NEC ACCESSORIES VERSA NEEDS AT NCA...

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450Kb/Sec. Transfer Rate
190ms Seek Time

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190ms Seek Time

3Xp Portable SCSI CD ROM **$379**
450Kb/Sec. Transfer Rate
240ms Seek Time

4X PRO External SCSI CD ROM **$639**
600Kb/Sec. Transfer Rate
180ms Seek Time

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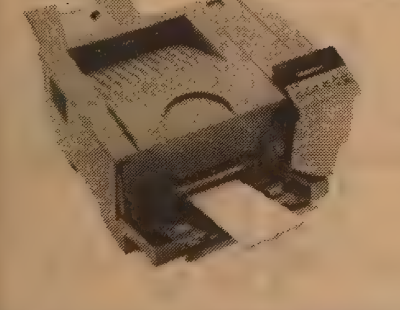
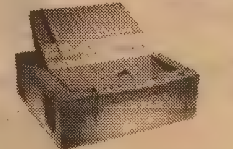


Silentwriter 1097

600 DPI Postscript

- 10ppm, 600dpi laser quality
- 7MB RAM
- Level 2 PostScript/PLC-5
- 35 resident Adobe scalable
- 14HP LaserjetIII fonts

$1359



Silentwriter 95fx

- Fax Capability
- 6ppm
- 300dpi laser quality
- 2MB memory expandable to 5MB
- Envelope Feeder
- 35 resident Adobe Scalable Fonts
- Apple Talk built in

$949

Silentwriter 610

- 6ppm
- 300dpi laser quality
- Uses Memory from system CPU
- 14 Window True Type Fonts
- 20 NEC True Type Fonts

$489

Silentwriter 640

- 6ppm
- 300dpi laser quality
- 3MB RAM
- Level 2 Postscript
- 17 resident Adobe scalable
- 35 True Type Fonts

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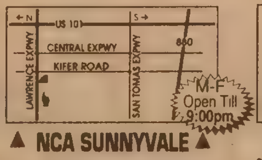
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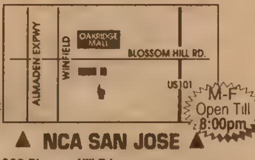
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SOUND, VIDEO & GRAPHICS

miro PCM-1pro SOUND CARD

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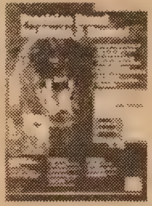
State-Of-The-Art Features:

- 16-bit
- 44 voice
- 128 instrument samples
- Yamaha OPL-4 Wave Table Chip Set
- IDE interface
- Sony, Panasonic, Mitsumi interface



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miro Video 20TD Live

NEW!

Graphic Card, Video Scaling, Video Capture & TV Tuner All in One!

VLB or PCI

- 2 Meg DRAM Windows Accelerator
- Cable-ready TV tuner with 100-station memory
- Video scaling provides full-screen video
- Still-frame video capture 640x480 @ 16.7 million colors
- 30fps video capture- 320x240 @ TV quality
- Feature connector for MPEG player boards

$449

miroVIDEO DC1 tv

Video Digitizing Directly To Your Hard Disk • Overlays, Titles, Special Effects • Super VHS Quality, PAL/NTSC Video Output

Miro's DC1 tv Video Capture Board Delivers Full Screen 640X480 Full Motion 30fps Video Capture And Non Linear Audio & Video Editing To The Personal Computer At A Remarkable Price!

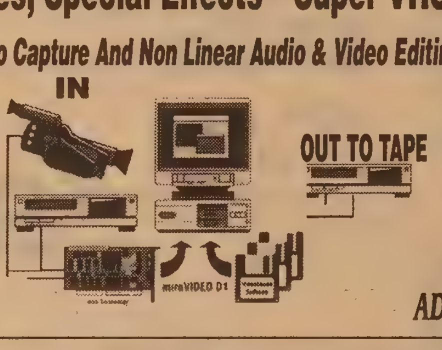
State-Of-The-Art Features:

- Non-linear video editing on any Windows PC
- Only One VCR for recording & playback
- Instant access to any frame
- Great transition effects
- Digital video back up
- No generation loss

Hardware Highlights:

- Supports all video formats
- Adjusts video filter
- on-board Motion JPEG compressor
- Digital video encoder
- Compatible with all graphics boards

MANUFACTURED IN GERMANY!



VideoStudio Software:

- Video Capture
- Video Editor
- Photo plus

INCLUDES ADOBE PREMIER

New Low Price

$599

Video D1

Now experience digital video on any Windows PC
Spectacular transition effects, Normally only available to video professionals
Fantastic multimedia impression, Integration of full motion video, titles and pictures adds a new dimension to personal computing
Hours of fun - pictures, clips and tricks combined with creativity lead to a thrilling adventure in motion and colors

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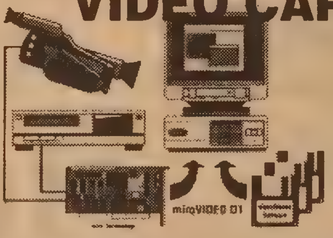


- Video Capture
- Video Editor
- Photo Plus
- HARDWARE HIGHLIGHTS:
- Supports all video standards
- Adjustable video filters
- miroVIDEO XL compressor
- 16.7Million colors compatible

SUPER VALUE!

$239

VIDEO GRAPHICS CARDS

miroCrystal 10SD

S3 86C805 Graphics Chip with 1MByte Highspeed DRAM
256 Colors with 1024X768
Top Resolution of 1280X1024
80Hz at 1024X768 Pixels

VLB **$89**

PCI............$99

miroCrystal 16SI

GRAPHICS Chip S3 86C805i with 2MBytes DRAM
256 colors with 1408X1024 Pixels
Top Resolution of 1408X1024
100Hz at 1024X768 Pixels

VLB...........$219

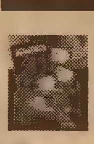
$129

PCI

miroCrystal 20SD

Graphics Chip S3 Vision864™ with 2MBytes DRAM
65,536 Colors in 1024X768 pixels mode
Top Resolution of 1408X1024
100Hz at 1024X768 Pixels
VLB, PCI

64-BIT!

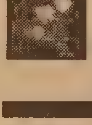


Your Choice **$239** VLB **$239** PCI

miroCrystal 20SV

Graphics Chip S3 Vision964™ with 2MBytes VRAM
65,536 Colors in 1024X768 pixels mode
Top Resolution of 1408X1024
100Hz at 1024X768 Pixels
VLB, PCI

64-BIT!



Your Choice **$339** VLB **$339** PCI

DESIGNED IN GERMANY!

miroCrystal 40SV

Graphics Chip S3 Vision964™ with 4MBytes VRAM
16.7 million Colors in 1152X864 pixels mode
Top Resolution of 1408X1024
100Hz at 1024X768 Pixels
VLB, PCI

64-BIT!

Your Choice **$499** VLB **$499** PCI

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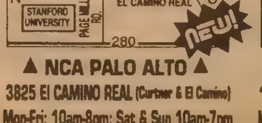

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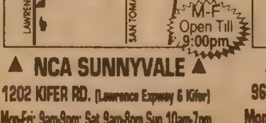

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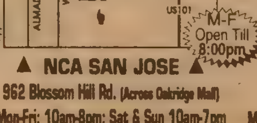

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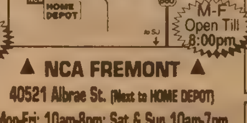

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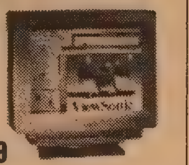
State of the Art

ViewSonic-15EX

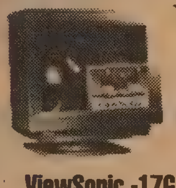


- 15" RGB Color Monitor
- 1024X768
- Non-Interlaced

$369

ViewSonic -15 1280 X 1024 ....$409
ViewSonic-15E 1024 x 768 ....$379
ViewSonic-15G 1024 x 768 ....$389

ViewSonic-17



- 17" RGB Color Monitor
- 1280X1024 , .27dpi
- Non-Interlaced
- Flat Screen

$879

ViewSonic -17G 1280 X 1024 ....$779

ViewSonic-20

- 20" RGB Color Monitor
- 1280X1024, .28dpi
- Non-Interlaced
- Dual Page Display

$1449

ViewSonic-21

- 21" Color Monitor
- 1600X1280
- .31dpi
- Non-Interlaced

$1695

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Workstation & CAD Quality Monitors

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- Digital Controls with Menu
- Full Screen Power Save
- MicoEmission

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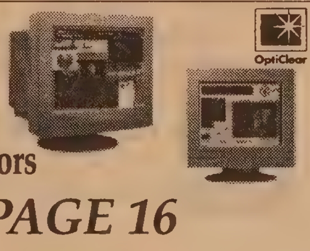
447L 17" Non-Int. 1280X1024,110Hz refresh .$789
447X 17" Non-Int. 1600X1280 ....$999
445M 21" Non-Int. 1280X1024,120Hz refresh$1999
445X 21" Non-Int. 1600X1280,120Hz refresh $2599

NEC



OptiClear

MultiSync Monitors

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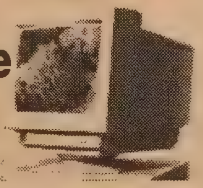
Affordable Quality Monitors

15" Performance



- 1280X1024,
- .28dpi
- Non-interlaced
- Flat Screen
- M1564PD

$329

17" SVGA

- 1600X1280
- .26dpi
- Non-interlaced
- "The Green Monitor"
- **Low Radiation**
- L1564PD

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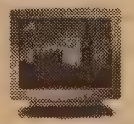

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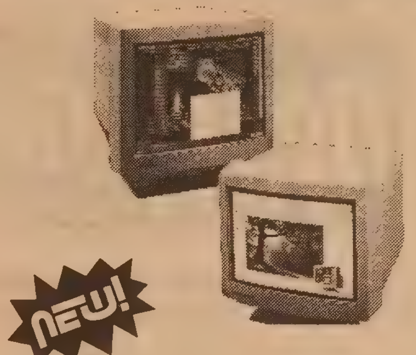

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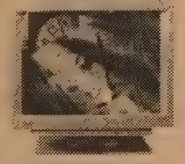

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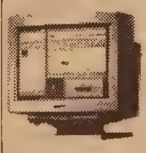

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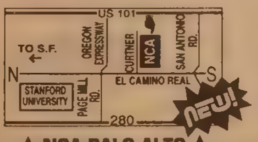
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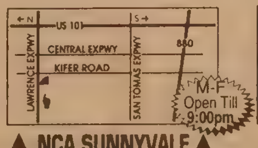
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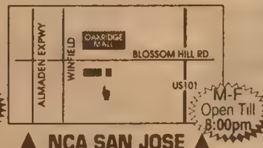
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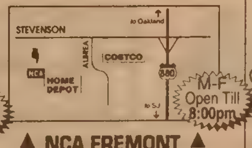
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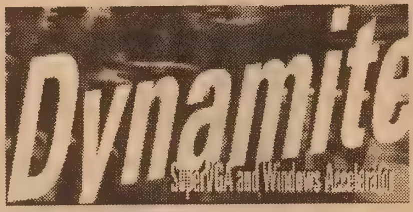

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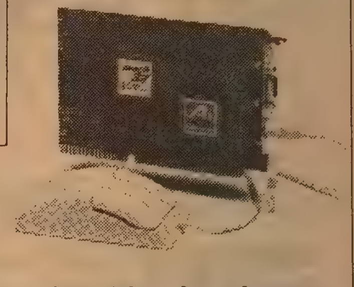

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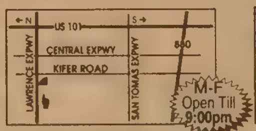

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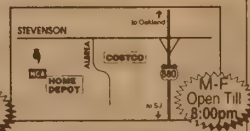

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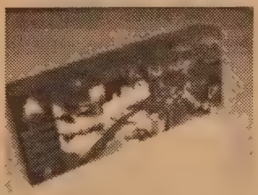

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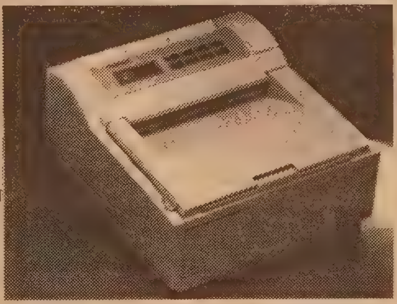

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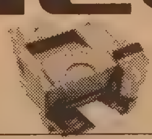

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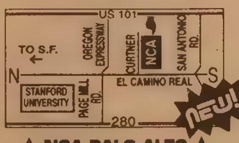
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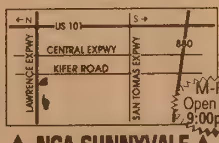
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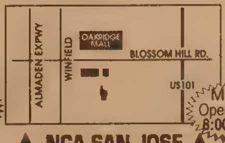
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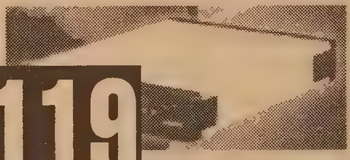

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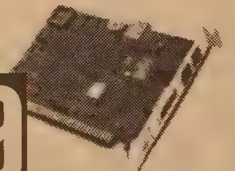

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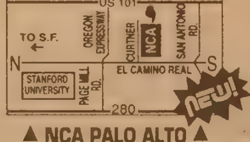
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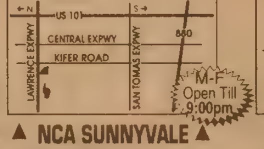
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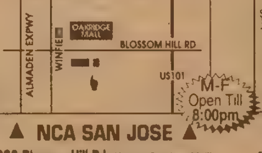
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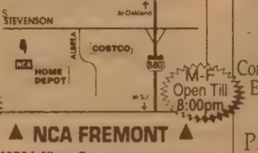
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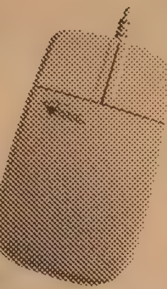

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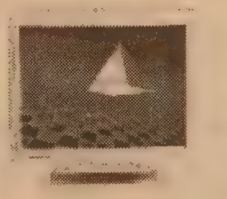

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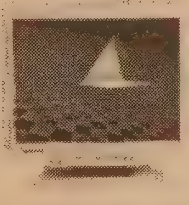

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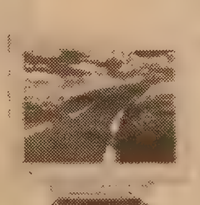

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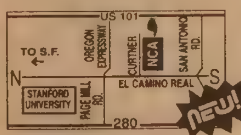

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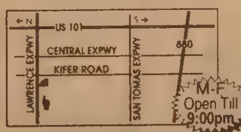

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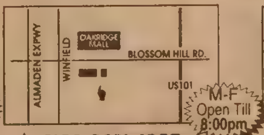

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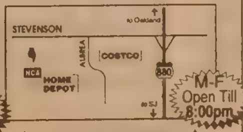

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- Media flexibility lets you print on plain and glossy papers, envelopes, or transparencies.
- Water-resistant ink provides smudge-proof, signature-ready output.
- 3-year limited warranty offers the longest protection in the industry.
- DOS & Microsoft Windows 3.0 & 3.1 software support ensures compatibility with most popular software applications.

$275

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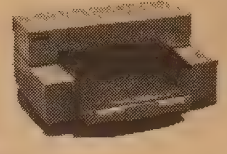
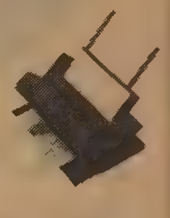


DESKJET 560
Color InkJet Printer

- 600x300dpi black printing with HP's Resolution Enhancement technology(REt) & 300dpi color produces high-quality output on plain paper.
- HP's ColorSmart makes color printing easy by automatically optimizing print settings to produce clear, vivid color.
- Twin-cartridge print mechanism eliminates cartridge swapping and prints true black and color on the same page.
- 3-year limited warranty offers the longest protection in the industry.
- 3-ppm print speed(black) is faster than most dot-matrix and inkjet printers.

$542

DESKWRITER 560 for MAC $542



DESKJET 310
Portable/Color InkJet Printer

- 300dpi inkjet technology produces crisp, water-resistant black printing for high-quality text and graphics.
- Portable operation delivers full-featured printing on the desk or on the road
- Optional color kit provides bold, bright color output on plain paper and transparencies.
- Six bitmapped fonts create professional-looking documents in both portrait and landscape modes.
- 3-ppm print speed is the same as the HP DeskJet 520 printer and faster than most portable printers.

$298

DESKWRITER 310 for MAC $299

DESKJET 1200C
High Performance Color InkJet Printer

- 600X300dpi inkjet technology with HP's Reolution Enhancement technology(REt) produces high-quality output in both black and color(up to 16.7 million bold, brilliant colors).
- HP's ColorSmart makes color printing easy by automatically optimizing print settings to produce clear, vivid color.*
- *Up to 7ppm(black text) and 1-2mpp(color) print speed delivers fast, high-quality black and full-color output.
- HP LaserJet printer compatibility ensures complete document portability and allows sharing of printer accessories.
- Four high-capacity print cartridges with hig-gain ink provide longer cartridge life and very low cost per page.

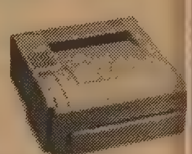
$1379

*For non-Postcript files only

DESKJET 1200C/PS
High Performance Color InkJet Printer

- 600X300dpi inkjet technology with HP's Reolution Enhancement technology(REt) produces high-quality output in both black and color(up to 16.7 million bold, brilliant colors).
- Up to 7ppm(black text) and 1-2mpp(color) print speed delivers fast, high-quality black and full color output.
- Media flexibility supports both black and color printing on inexpensive plain paper and allows use of special media like glossy paper and transparencies.
- Four high-capacity print cartridges with high-gain ink provide longer cartridge life and very low cost per page.
- PostScript Level 2 software from Adobe with 35 Adobe Type 1 typefaces and HP JetDirect card for LocalTalk ensure compatibility with virtually all Macintosh computers and software.

$1999



LASERJET 4L
Personal Laser Printer

- HP's Memory Enhancement technology(MEt) effectively doubles printer memory for more complex documents and downloaded fonts.
- HP's Resolution Enhancement technology (REt) and microfine toner produce the best 300dpi output available.
- EconoMode printing saves money by cutting toner use in half.
- One-button front panel makes printer easy to use.
- Intelligent on/off saves electricity by automatically turning printer on and off as needed.

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LASERJET 4ML for MAC $958

LASERJET 4P
Personal 600dpi Laser Printer

- 600dpi with HP's Resolution Enhancement technology(REt) and microfine toner produces the best 600dpi output available.
- Custom media handling accepts paper as small as 3 by 5 inches and up to 42 pound thickness.
- 45 scalable typefaces-from .25 to 999 points-create a wide variety of professional-looking documents.
- Full range of expansion options including additional memory(up to 26mb), Adobe PostScript Level 2 SIMM, and HP JetDirect EX network interface.
- Saves money with EconoMode printing that cuts toner use in half and Powersave that uses 50-70% less energy(EPA Energy Star program approved)

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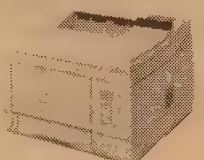
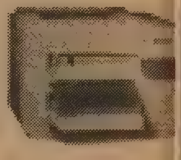
LASERJET 4MP for MAC $1399



LASERJET 4PLUS
High Performance Laser Printer

- RISC-based processor delivers fast, 12ppm performance, even for complex documents.
- HP's Resolution Enhancement technology(REt) and microfine toner produce the best 600dpi output available.
- 45 scalable typefaces create a wide variety of professional-looking documents.
- Up to four software-selectable paper inputs handle up to 850 sheets and 75 envelopes.
- Automatic language and I/O switching provide easy, unattended operation in multiple-platform environments.

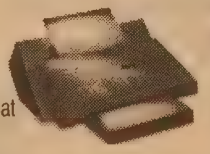
$1396



LASERJET 4Si
Laser Printer For Workgroups

- 17ppm print speed and 75,000 page monthly duty cycle meet the high-volume demands of large workgroups.
- True 600dpi resolution with HP's Resolution Enhancement technology(REt) and microfine toner produces the best 600dpi output available.
- Up to three software-selectable media inputs handle up to 2,000 sheets and 100 envelopes.
- Automatic switching between enhanced HP PCL5 and optional Adobe PostScript Level 2 languages gives easy, unattended operation in multiple-platform environments.
- HP Vi-Tronics(high-speed bi-directional) parallel interface and optional HP JetDirect cards provide powerful, flexible networking.

$294



FAX-950
Plain Paper Fax Machine

- Hp inkjet technology creates plain-paper faxes that look better, cost less, and won' curl or fade.
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- User-upgradeable memory allows easy expansion for improved memory transmission, out-of-paper reception, and other advanced functions.
- Verification stamp creates a visual record of successful transmission.

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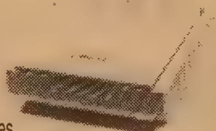

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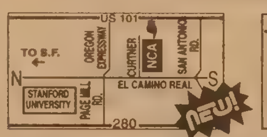

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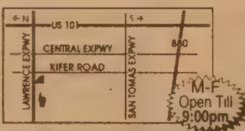

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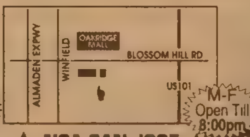

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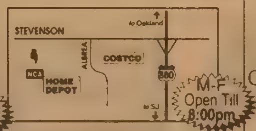

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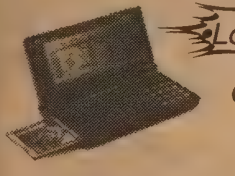

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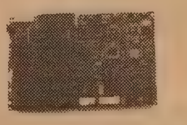

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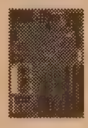

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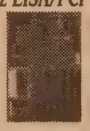

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- ZIF Socket for future upgrade
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90MHz Pentium PCI-90 Super Motherboard

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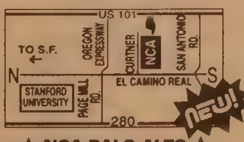

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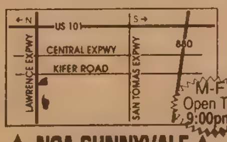

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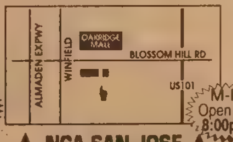

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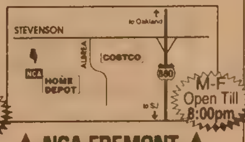

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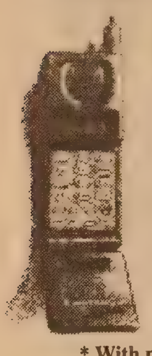

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- Lightweight 12.1
- 75 minutes talk time
- 30 number memory
- Automatic redial
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$148*

* With purchance of starter kit at $89.95 & after $25 instant activation rebate

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- 5.9 ounces with battery!
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- FULL 3 WATTS OF POWER
- 70 minutes talk time
- 102 memory locations
- Incoming call screening
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- 99 # Alphanumeric memory
- Speed dialing
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- 1 year warranty
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DPC-950

- Only 8.7 ounces
- 9 Turbo dial locations
- 30 memory locations
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- Battery provides 100 minutes of talk time
- Signal/volume meter

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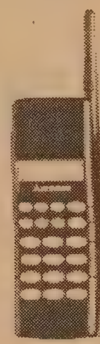

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- Signal strength meter
- Any key answer
- Call timer

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- Musical alert
- Bright colored housings
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- Automatic pager on/off
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- Message timestamping
- Message slot number
- Memory storage when off
- Front mount display

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- Musical alert
- 12/24 hour timekeeping
- Automatic pager on/off
- Message timestamping
- Message slot number
- Memory storage when off
- Front mount display

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MOTOROLA

BRAVO PLUS

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- Vibrate
- Message timestamping
- Message slot number
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- Freeze screen

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NEC

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- Clock
- Low battery indicator
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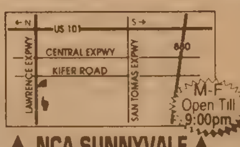

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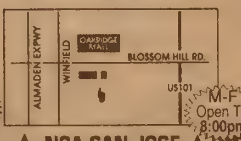

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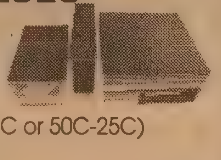

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250Watt UL approved AT	$49
250Watt UL for Tower	$49
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BK400VA	$169
BK450VA	$199
BK600VA	$279
BK900VA	$399
BK1250VA	$519

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SPIKE BAR SUPER 7 7-OUTLET AC SURGE W/NOISE FILTER & DIAGONTIC CIRUITRY	$15.99
SPIKE BAR (SK 6-6) 6-OUTLET PREMIUM SURGE SUPPRESSOR	$22.99
TERMINATOR TR6 SURGE SUPPRESSOR 13,000 amp protection	$28.99
ISOBAR4 ULTRA PREMIUM SURGE SUPPRESSOR W/ CIRCUIT DIAGNOTICS	$43.99
ISOBAR6 6-OUTLET PREMIUM SURGE SUPPRESSOR	$47.99
POWER MISER AUTOMATIC MONITOR SHUTDOWN TIMER & SURGE SUPPRESSOR	$49.99

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CF-9302SD	Mid-Tower 230W	$79
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TrackMan	$59.99
TrackMan Portable	$89.99
MouseMan Cordless	$89.99
MouseMan serial	$52.99
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First Mouse	$26.99
MovieMan	$249.00
ScanMan Power Page	$469.00
ScanMan 256	$199.00
ScanMan Easy Touch	$209.00
ScanMan 32	$109.00
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Microsoft Mouse II OEM Bus version	$69

MICROSPEED

NAME	PRICE
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MacTRAC 2.0 SE & Mac II	$69.99
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MicroTRAC serial, PS/2/MAC	$57.99/65.99

MOUSE SYSTEMS

SEE PAGE 21

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WARRIOR 5 PLUS	$9.99
RAIDER 5 JOYSTICK	$15.99
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WARRIOR 5 Deluxe Analog Joystick for PC	$9.99
Smart Game Card 2-Game ports Selectable Speed	$16.99
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3M 2120F FORMATTED XMAT	18.00	89.00
MAXELL DC2120 UNFORMATTED	16.99	79.00
MAXELL DC2120 FORMATTED Q80	18.99	89.99
6000(1/4" TAPES)		
SONY QD6150 150MB	$19.95	$90.00
SONY QD6250 250MB	$19.99	$90.00
SONY QD6525 525MB	$26.99	$125.00
MAXELL D6250 250MB	$19.95	$95.00
MAXELL D6525 525MB	$24.99	$117.00
3M DC6525 525MB	$29.95	$145.00
3M MAGNUS 1.6GB	$CALL	$CALL
DAT 4mm 90meters		
SONY 90M	$14.99	$65.00
MAXELL 90M	$15.95	$69.00
DAT 8mm 112meters		
EXABYTE UP TO 5.0GB TAPES	$18.00	$89.00
TDK	$9.99	$45.00
DIGITAL	$11.99	$55.00
FLOPPY DISKS		
SONY 2.88M DISKS	10PACK ONLY $62.50	
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BULK 1.2M 5.25" FORMATTED	.39¢	25PACK $9.99
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SYQUEST 44MB SQ400	$59.00	$295
SYQUEST 88MB SQ800	$89	$439
SYQUEST 105MB 3.5"	$57	$279
SYQUEST 200MB 5.25"	$97	$460
SYQUEST 270MB 3.5"	**$85**	**$410**
BERNOULLI	See pg. 25	
SONY M.O. 128MB OPTICAL	$39	$185
VERBATIM 128MB OPTICAL	$39	$185
FUJITSU DYNAMO 128MB	$39	$185
KOMAG 128MB OPTICAL	$29	$139
RICOH 128MB OPTICAL	$45	$215
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MITSUMI High Quality Keyboard	$29.99
ALPS SWITCH Click-Style	$39.99
KEYTRONICS 2000+	$39.59
KEYTRONICS 2001	$29.99
MACINTOSH Compatible Click-Style Extended	**$69.99**

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DESCRIPTION	PRICE
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FOCUS 8000 with Calculator	$59.99
FOCUS 9000 with Calculator / programmable	$69.99

MICROSPEED

DESCRIPTION	PRICE
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DELUXE 101-KEY TACTILE includes PS/2 adp.	$58.99

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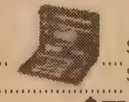

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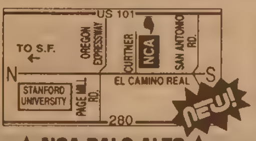

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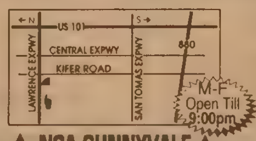

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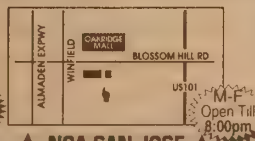

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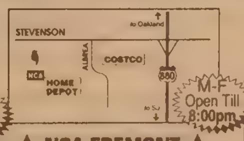

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Multi & Media beyond

Amiga

3-D Animation Project

A Learning Experience

This month I'd like to share with you my experiences working on my first (read: paying) 3-D animation job. Jim Carey, the multimedia producer I interviewed for this column a few months back (and not Jim Carrey the actor!), recruited me to do some LightWave 3D modeling and animation. The project was to create three short 3-D animations involving a satellite-based phone system.

TAKE ADVANTAGE OF RESOURCES

First off, let me say that I am far from being a LightWave expert. In fact, initially, to say I was good at it would have been stretching the truth.

However, I have always found 3-D animation intriguing, and have diligently completed every tutorial I've come across. The publication *LightWavePro* has been particularly helpful in this regard.

I also created my own database using Helm, which includes brief descriptions of 3-D modeling articles and tutorials, and any tips I pick up; I can then do a quick keyword search and find the information I need, and/or a reference that will point me to a particular article. You should be able to build your own using any database program. (If you're interested in using Helm for this, see the June 1994 issue of *Amazing Computing.*)

Another resource I use is the LightWave Internet Mailing List. Here, LightWave-related email messages are sent to a central Internet address. All of the email is then redistributed to all members of the mailing list. You can learn a lot by just reading the mail; of course you can always ask your own specific questions.

The LightWave Mailing List is frequented by the likes of Alan Hastings and Stuart Ferguson, the LightWave programmers, as well as John Gross, a 3-D animator with Amblin Imaging (*seaQuest DSV*) and editor of *LightWavePro*, just to name a few. Be advised that this is a high-volume operation, and it is not unusual to receive a hundred email messages in a single day!

BY DOUGLAS J. NAKAKIHARA

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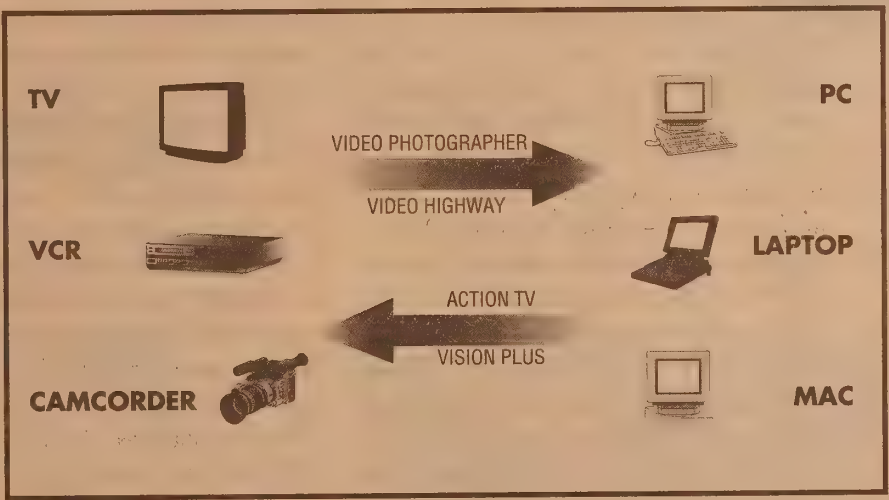

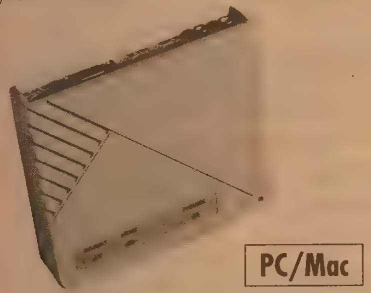

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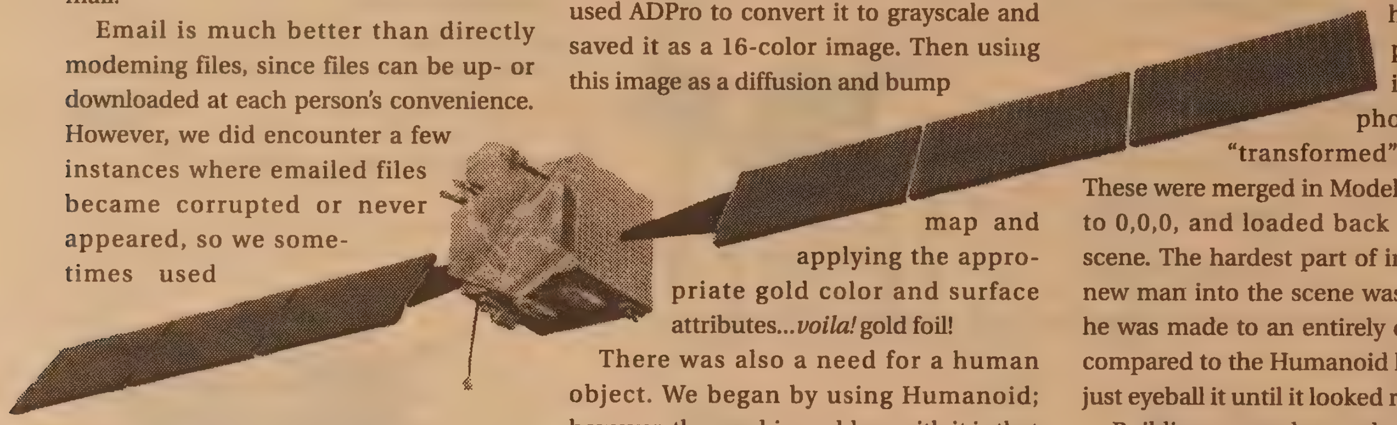
THE INTERNET AS ARTIST'S TOOL

The Internet played a vital role in this project. Although Jim and I only live thirty minutes apart, it would be a hassle to personally exchange computer files, especially considering we needed to exchange files on nearly a daily basis. Although we use different online services—Jim uses Portal and I use BIX—both services support Internet mail.

Email is much better than directly modeming files, since files can be up- or downloaded at each person's convenience. However, we did encounter a few instances where emailed files became corrupted or never appeared, so we sometimes used direct modem connections. Luckily the calls were local.



Generally, Internet email is for alphanumeric text only and, therefore, binary files cannot be transferred. However, thanks to some clever utility programs that can convert binary to ASCII and back again, we were able to exchange any type of file we wanted! Jim was even able to send images to England, where the client is located.

Since 24-bit files, even at video resolution, can be quite large, we nearly always used JPEG compression on image files before transmitting them. I used Pegger exclusively because of its speed. It is many times faster than using an image processing program because the conversion is direct.

CREATING THE OBJECTS

My work turned out to be more problem-solving than anything else. I often only had a general idea of what was required, and it was up to me to come up with a solution. In many instances I used techniques I'd read about, and just tweaked them to suit the situation. For example, for a "cloudy" looking object, I based its surface on a tutorial I had for animated fire, and just modified the surface settings. It came out looking really nice, although we ended up not using it because it was too busy for the scene.

For this project we also needed a fairly detailed satellite. Modeling it was not too difficult, but Jim was very concerned about getting the right look for the gold foil that covers most of its surface. I thought about it for a while and even scrutinized some aluminum foil.

Now, if you dismiss the reflective properties of foil, it is just a relatively flat surface with some crinkles in it, very similar to crinkled paper. Scala MM just happened to come with such an image, although it was designed for a presentation background. I used ADPro to convert it to grayscale and saved it as a 16-color image. Then using this image as a diffusion and bump map and applying the appropriate gold color and surface attributes...*voila!* gold foil!

There was also a need for a human object. We began by using Humanoid; however, the one big problem with it is that the models are not clothed. Jim suggested I try to surface what would look like a T-shirt on the model. The result was pretty bland, so I went on a search. Eventually, I found a tileable texture image that looked like woven material on Syndesis's 3D-ROM CD, which I tiled to full-screen using DeluxePaint. I then modified the T-shirt surface using a grayscale version of this as a diffusion map and changed the color. The result was stunning—it looked like a Christian Dior sweater. The only thing missing was the logo! Sadly, the client nixed the guy because he was "too cool!"

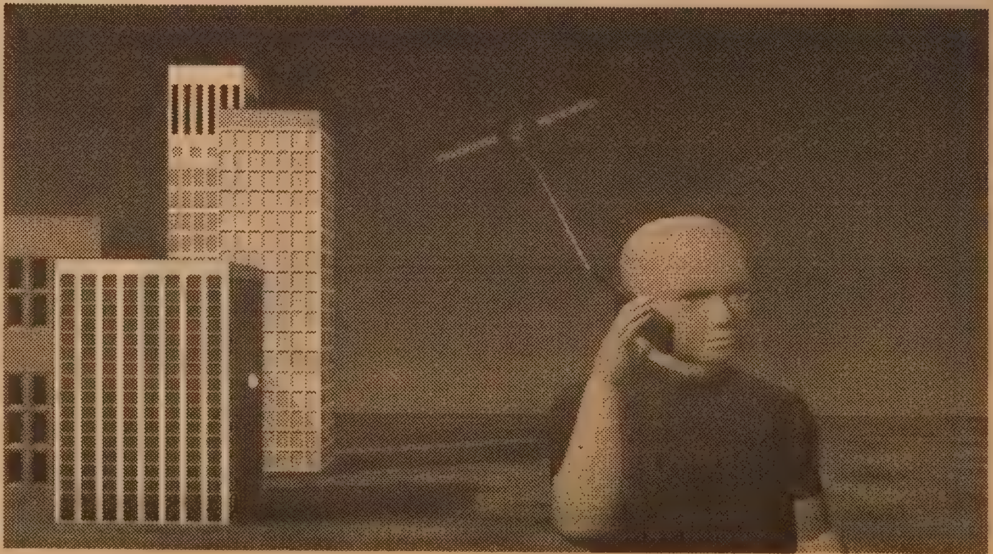
We ended up settling for a man in a business suit, which was a highly modified version of an object from 3D-ROM. Since the original model was sitting reading a newspaper, I had to remove the extraneous pieces (i.e., chair, newspaper, etc.). His sleeves would not bend properly using the existing polygons, so I cut out just his shoulders and extruded the bottom using three segments to create a new sleeve. After manipulating the points separating the segments, I was able to acceptably bend it at the elbow.

Also, the original hand was pretty ugly, so I replaced it with Humanoid's hand. Since I already had the Humanoid hand perfectly keyframed holding a phone, I saved it and the phone using the "transformed" object save. These were merged in Modeler, recentered to 0,0,0, and loaded back into my new scene. The hardest part of integrating the new man into the scene was the fact that he was made to an entirely different scale compared to the Humanoid hand. I had to just eyeball it until it looked right.

Buildings were also on the list of objects to construct. In retrospect, the technique I used seems almost too easy. All I did was draw one side of several buildings in 16-color grayscale in DeluxePaint. I depended heavily on the snap-to-grid feature to get symmetrical windows and other features. I used lighter shades for features that should be raised and darker ones for indented features. Using these images as diffusion and bump maps on simple box objects, I had (relatively) instant buildings. The great thing about this technique is that it is easy to change the building color as well as its shape.

AMIGA ADVANTAGE

I needed to be as efficient as possible with my time and get the most out of my equipment. Therefore, a lot of things got done while I was asleep or at work, and I took



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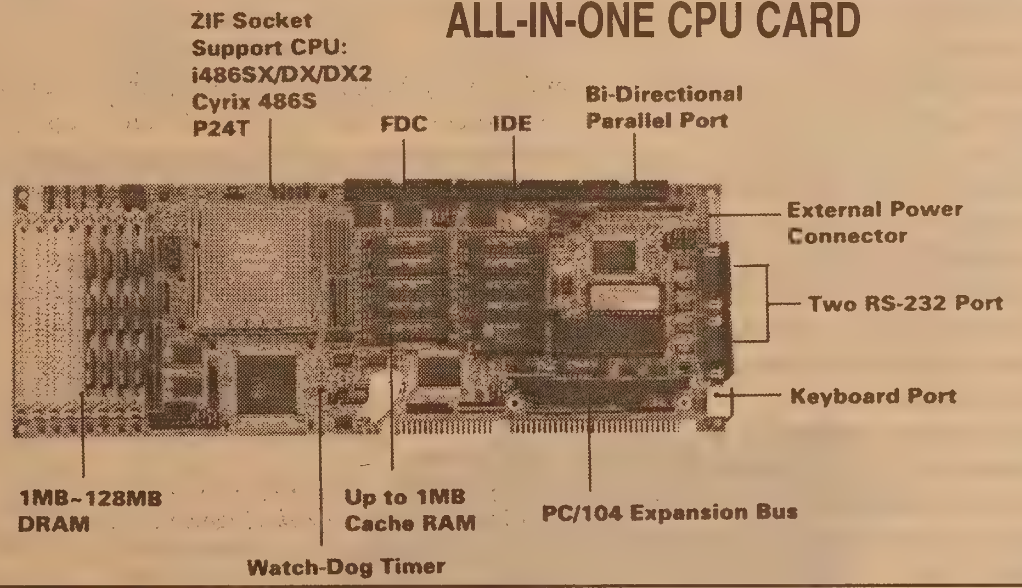
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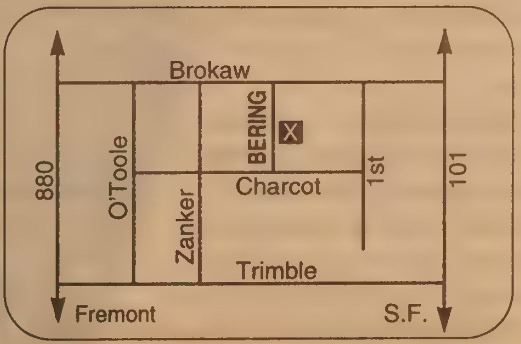
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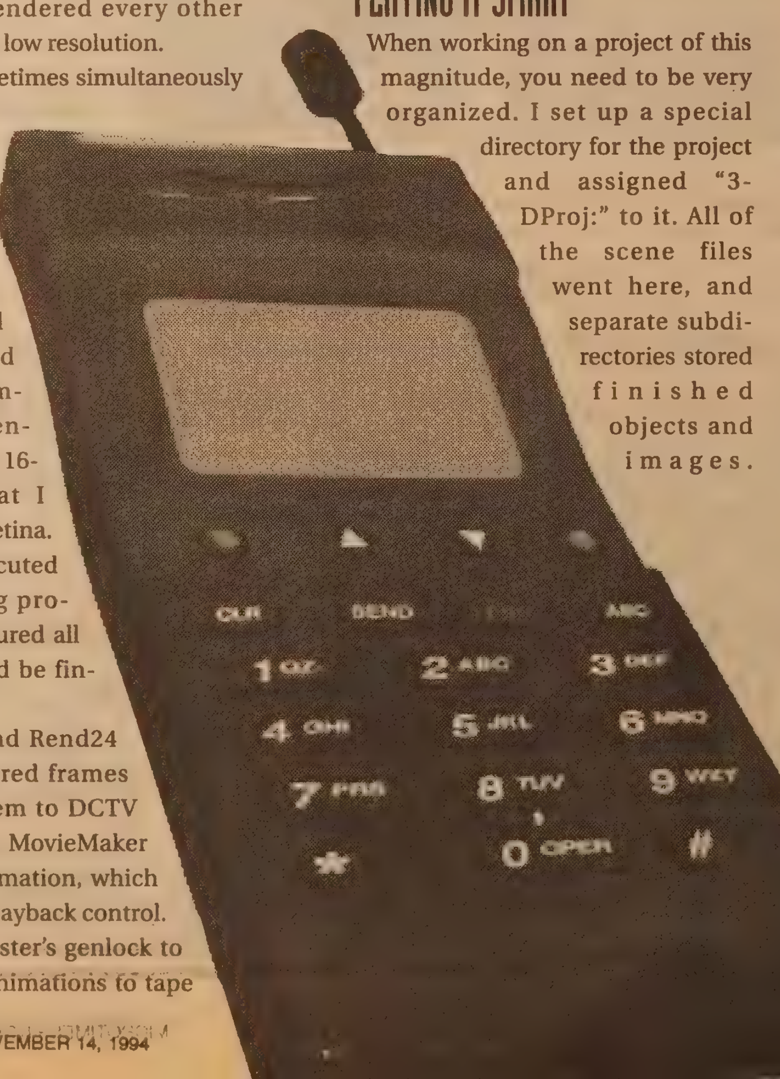
full advantage of the Amiga's multitasking abilities. My main setup consists of an Amiga 3000 and a 4000, networked using AmigaLink. The 4000 has a Toaster in it, and I have the standalone LightWave on the 3000. The 3000 has a 500MB hard disk partition that's dedicated to storing rendered image files.

Because rendering the LightWave frames to a network device from the 4000 would be very slow, I rendered them to RAM:. An ARexx script I wrote runs in the background, monitors RAM: for finished frames, and moves them to the 3000's hard disk as they are completed. In fact, I had another ARexx script that automatically rendered specific test frames at high resolution, executed my "background move" script, and then rendered every other frame in the scene at low resolution.

> *Many programs have a macro language, but ARexx can simultaneously control more than one application.*

My 3000 was sometimes simultaneously rendering a different scene and saving frames to the same hard disk partition. I wrote another ARexx script that executed MagicLantern and automatically compiled all of the rendered frames into a 16-bit animation that I could view on my Retina. This script was executed using a scheduling program at a time I figured all of the frames would be finished.



Other times I had Rend24 intercepting rendered frames and converting them to DCTV images. I then used MovieMaker to view a DCTV animation, which gave me complete playback control.

Jim used the Toaster's genlock to record test Amiga animations to tape with similar success. (The final frames will be rendered using a Raptor in NTSC and PAL resolutions. These will be saved to Exabyte tape and then single framed to video tape. I can't wait to see the final product.)

As you can see, ARexx played a big part in all of this, and by its very nature requires real multitasking. Many programs have a macro language, but ARexx can simultaneously control more than one application. However, perhaps a more important advantage is that except for specific commands used by the applications being controlled, there is a consistent ARexx language. You don't have to learn one macro language for this and another for that.

PLAYING IT SMART

When working on a project of this magnitude, you need to be very organized. I set up a special directory for the project and assigned "3-DProj:" to it. All of the scene files went here, and separate subdirectories stored finished objects and images. Whenever I loaded an object or image into a scene, I always used the assigned name and not the full path. This makes the scene portable, so it can be rendered on any Amiga, by simply assigning that name to the appropriate directory.

Another thing you should do when modeling is to keep saving at each step. Using the same main file name with an incremented numerical extension works well (e.g., Phonebase01, Phonebase02, ...). If the object is made up of different parts, you should save these individually, as well as any Boolean cutting objects you use. I'd usually set up a special subdirectory to hold all of these related files. Only the final object was copied over to the main project-object directory. You never know what modifications will need to be made later on, and it's great not to have to start from scratch.

You should also back up frequently. Tape is the only serious solution; SCSI tape backup units are available for a few hundred dollars. I picked up an internal 16GB DDS-2 DAT drive for under $1000. You can back your drives up at night; because the Amiga multitasks, you can even do this while it is rendering. Think of it this way: if you've just spent days perfecting an object, how much is it worth to you to get it back, if it suddenly disappeared? Personally, I'm a "backup fanatic" and have five sets of full backups, so if one fails I can fall back on a previous backup. I also do frequent smaller incremental backups of changed files to a Syquest cartridge.

A REAL PROJECT

There is nothing like working on a real project when it comes to learning. You'll find you retain much more information than if you were just doing it for your own personal enjoyment. I ended up taking a self-taught crash course in LightWave and learned more in a month than I ever knew.

Moreover, the need for good 3-D animators is growing exponentially. Take a look at the TV commercials being aired any evening. Nearly all of them seem to use 3-D animation to some degree, and maybe half are entirely animated. A project here and there could help pay for your Amiga. Good luck and have fun! ■

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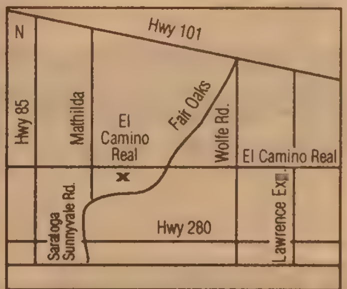

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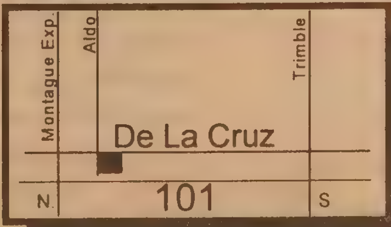

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MULTIMEDIA 101

How I Learned To Love My Computer

Or, Joe Gets Up And Running

A Focus Group Of One

So how might Joe Sixpack feel after forking over the bucks for a Power Mac 6100/60? Extrapolating from my feelings, he'd probably be curious about its capabilities and anxious to get something done with it, not to mention confused by the details of so much to learn and suffering a bit from buyer's remorse. After all, that three and a half grand could have bought quite a nice vacation. Ah, but the glittering promises of multimedia will refresh the mind and body just as well!

Or perhaps not. The purchase of a new computer is a substantial investment of time and energy, as well as cash or credit. The returns are not always immediately apparent, as frustration and bewilderment frequently edge out excitement or wonder as the dominant sensation. The Cupertino crowd (and by implication, other computer manufacturers) may consider what follows as an informal but free focus group (albeit a group of one), while those about to embark on the same voyage will hopefully find some guidance within. It is not a series of lab tests for the tech types, but a somewhat anecdotal collection of impressions with a weather eye open for what might cause difficulties for our buddy, Joe.

SPACE IS THE PLACE

Not only are there major investments of time and energy, but eventually there's also a large investment of space. This is astoundingly easy to overlook as one wrestles with the questions of CPU and configuration, but as soon as you get the boxes home you're liable to find that the space you thought you had earmarked is inadequate. One reason for this is that not only do you have to allow for the size of the CPU case, but you should also add nearly 4 inches to the depth at the back for the monitor and SCSI cables; also, you need another foot at the front for an extended keyboard and wrist support. When you've also got to find space for the printer, the external CD-ROM drive, two speakers, and the mouse pad, you're looking at better than 12 sq. ft. of space

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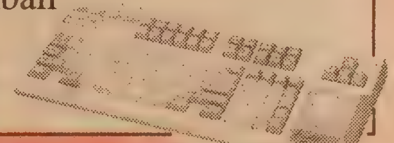

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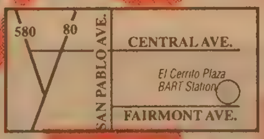

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before you've sat down yourself.

Obviously, Performas with internal CD-ROM drives and lacking satellite speakers can cut the space down a little, but the depth required for the Power Mac 6100 was quite a surprise to me. If the keyboard and pad is in front of the CPU case, at least a 30-inch-wide table is needed; wider would be more comfortable.

Besides the computer and its accessories, the other accoutrements, such as phone, reference books, and vast quantities of press releases, make the home office quite an undertaking. It's no surprise that home-office furniture is advertised so much in the office-supply catalogs—and, if you're going to buy, remember to buy a deep desk. A skinny one just won't do. In the name of customer service, this is something that a good computer dealer should mention early in the buying process.

CORDS AND CABLES

The good computer dealer should also mention the question of cords, cables, and power supply at about the same time. This isn't going to be news to experienced multimedia doers, but it seems as though you're always plugging something into or unplugging something from the back of the machine—so easy access to the back is worth planning for.

One answer is to actually position the CPU sideways on your desk. It doesn't look very elegant, and you may run into other problems (such as some cables being too short), but, depending on your individual situation, it may be the least of several evils. Of course, the true professional would do almost anything to avoid having his or her computer against the wall.

What are all those cords and cables? This is where the Performas and internal CD-ROM drives begin to seem really attractive. Firstly, all the cables appear to be made in China—so if you have difficulties accepting the human-rights situation over there, you're stuck. Secondly, the sheer number of them is almost bound to end up in a tangle. I quite like messing around with such things and arranging cables nicely, but even I found the process a bit of a pain.

There's no real alternative if you've bought a component machine—all those components have to talk to each other somehow—but, if you're in a hurry to get up and running, you're going to feel like there's just too many cables. Count 'em: six power cords, one each for CPU, monitor, printer, CD-ROM drive, modem, and speakers and we haven't talked about telephone answering machine, lighting, sound system (with seven of its own in my case), and any other electronic gadgets that may be around; SCSI cable from CPU to CD-ROM drive; cable from CPU to monitor for video; sound cable from CPU to monitor (okay, that one's sort of optional but there are advantages to using it, although the sockets are kind of wobbly); whether you use that or not there's at least one connection for the computer sound to the external speakers; ADB connection from CPU to keyboard to mouse; printer cable; modem connection; and audio connection from CD-ROM to speakers.

And, as those of you who are well versed in multimedia will have noticed, we've barely begun to set up a full-scale rig.

So, true, this is somewhat like complaining that ice cream is cold, but if you're just getting into this, realize that it's something you're going to have to deal with. It's important to get at least some of those cables arranged properly—unless you like the audio buzz that the speaker cables can pick up from something that isn't shielded properly. Despite much fiddling around, I'm still suffering from that buzz—I can get rid it of for a while but it reappears.

THE CASE

I can't figure out why Apple put the Power Mac 6100 in quite such a low-slung, pizza-box case. If you put the monitor on the case, it's not high enough. Unless you've got a really expansive desk or are working with some degree of offset, the extended keyboard obstructs the power switch, so you've got to jiggle the keyboard around when you turn on—although I suppose that afterwards it prevents you from accidentally depressing the power switch. It's also a little awkward inserting or extracting a floppy. (And the floppy drive is just incredibly noisy. And the fan can get pretty irritating with its whine after awhile. These two things do not help the consumer feel confidence in a new machine—it makes one think that it's designed tackily and manufactured shoddily.)

I know this is utterly primitive, but an inch or two taller would just look a little more impressive—and even be useful if that meant that the footprint could be reduced.

THE CPU & EMULATION

No doubt about it—this is a fast machine compared to my old model for the very limited tasks I have imposed upon it so far.

However, I can already tell that I'll become dissatisfied with its speed. Once, I couldn't believe the way people complained about the speed of computers, but when I began working with them, my sense of time sped up and became more acute. That process is occurring again. Soon I'll be kicking my heels while the machine bumbles along. The whole question of whether Power Macs can emulate 68000 processors to run their applications well enough to be acceptable appears to be a red herring and not worth worrying about.

It seems to be the CD-ROM and modem speeds that impose whatever current laggardness I notice. This whole question of one's perception of time probably needs to be explained to the Sixpacks, who are accustomed to the instant visual but passive gratification commonly associated with TV, Hollywood movies, and real life.

SYSTEM 7.5

Of course, if you buy a new Mac now, System 7.5 should be included. The two major features are QuickDraw GX and PowerTalk. PowerTalk allows one to exchange email and work collaboratively on a network—it's not for Joe. QuickDraw GX handles printing in an improved manner. Again, it won't make much difference to the beginner—but being able to drag the file you want to print to a desktop printer icon is handy.

Other than those advanced additions, System 7.5 has many very convenient features that beginners will be able to use immediately. I particularly like the WindowShade, which allows you to "roll up"

> *The purchase of a new computer is a substantial investment of time and energy, as well as cash or credit.*

a window by clicking on its title bar two or three times. There's an option of a sort of "whooshing" sound just like a real window shade that's out of control; it's actually a little irritating. The clock in the menu bar is finally standard. Stickies are similar to their real life counterparts and allow you to stick notes all over your screen to yourself.

There are some changes to the Apple menu that basically provide yet another way to get at files; I can't see that they'll do much for neophytes, although no doubt some will develop their work style to make use of them. The Extensions Manager could save you a lot of time if you've dragged something you shouldn't have into your system folder on the advice of some erroneous CD-ROM. There are new abilities to open DOS and Windows files and files you don't have the application for, as well as various tweakings of features, such as "more colorful desktop patterns" (but there's still not one I really love).

The Macintosh Guide provides a pretty good system for finding out how to do various things with your Mac, although it's only accessible when you're in the Finder. Another less than ideal situation is that once you're using the Guide, it stays in front of all other windows—you can enter text in a Word document while the Guide is open, but you won't necessarily be able to see what it is unless you carefully place the Guide window out of the way.

From the multimedia point of view, the new and improved sound control panel allows you to select input and output devices. I love the way you can change the colors of the Audio CD player, and the fact that you can enter the name of the CD and each track, program the tracks, and keep the program for future use. QuickTime 2.0 is a big improvement—a much bigger picture and better playback.

THE MULTIMEDIA KIT

Here's the real juice for Joe's new multimedia life—but he's had to wade through most of the above to get here!

The kit consists of the AppleCD 300e Plus external CD-ROM player, a pair of AppleDesign Powered Speakers II, a pair of Apple headphones, plus all the cables and cords needed to set up including a terminator (Why couldn't Apple be this thorough with the cables for printers?), driver software, three CD-ROMs in the box, a brochure from which to select three more, and software licenses, manual, and warranty card.

The CD-ROM player really jerks its disc drawer out in a hurry. The drawer is low to the ground, so if it's at desk level and you haven't put it on a phone book, it's too easy for it to crash into something—like the keyboard cable or the phone cord or your headphones or anything else that might just be cluttering up your otherwise undoubtedly immaculate desk. Once the drawer is open, guess where the button to close it again is. That's right, it's very poorly positioned immediately underneath the disc drawer. Once more, a more generous case could have alleviated a slightly tacky feel. And also again, the machinery is just plain noisy when spinning the disc, and not confidence-enhancing.

Apple says that the speakers are designed for personal listening; they certainly won't fill a room with sound, although you could undoubtedly annoy your office mate. They actually sound pretty good for their size, but I think Apple is exaggerating when it claims that they have "rich bass." They cannot handle the full output from an audio CD—at least not the "rich bass" kind I listen to. The supplied headphones look tacky (like the ones Radio Shack sells for $5.99); while light, they are not very comfortable (maybe my head's just a funny shape), but they do sound surprisingly good—even with "rich bass." I did find the output level to the headphones to be only

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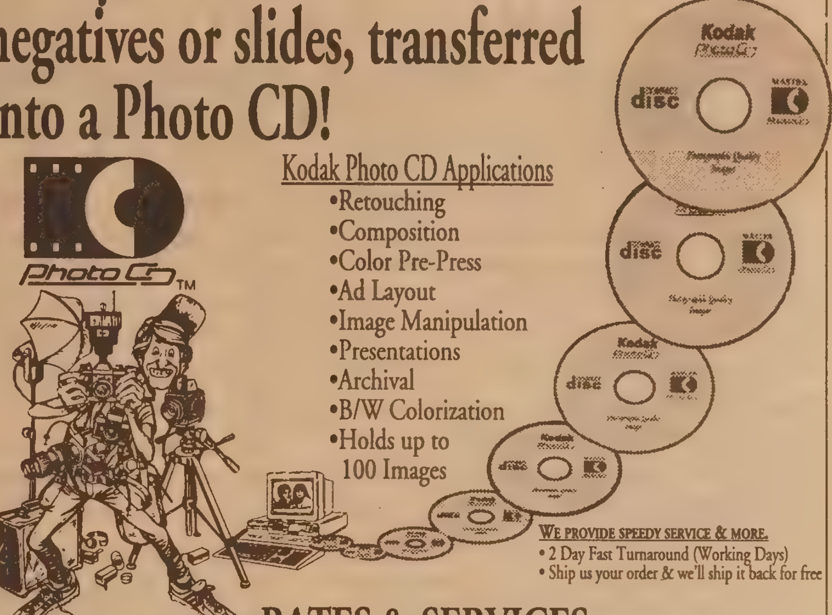

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adequate, either directly from the player or through the speakers (which cut out as soon as you attach headphones to them).

Where the Multimedia Kit really falls down is on the bundled CD-ROMs. There's a moderate selection that you can send off for in the brochure—but unless Joe really knew what he was picking he could end up with some less than impressive titles. And you don't get to pick from among what I consider to be the best titles. Most surprisingly, Apple's own Wacky Jacks and Travelrama USA titles are not included.

However, that's nothing compared to the joke CD-ROMs that are packaged right there in the box, the ones Joe's going to try out right away. In short, Joe's gonna feel burnt, he ain't gonna unnerstand what the big deal is about all this multimedia stuff.

Okay, one title is Compton's Interactive Encyclopedia, which at least works quite well as an example of how to cram a lot of stuff onto a disc and link it and search it. Oooh, it even has lists of sounds and video clips—and my dogs found the clip of a dog barking very convincing. The encyclopedia can be quite useful for looking up some things, but sexy it's not. If the other two discs delivered a decent multimedia experience, Apple could get away with this, but as it is, Compton's Encyclopedia is the best of the set.

The road to hell is supposedly paved with good intentions, and the inclusion of Software Dispatch may be well intentioned. Joe just bought the hardware, now he needs some software to do something with it. Software Dispatch presents him with demos of lots of different applications; he can unlock the full versions by calling Software Dispatch's 800 number and giving them his credit card number.

Naah, Joe wants to rock and roll with his new disc player, he's already blown a wad and he doesn't want a shopping mall on a disc to be his first multimedia experience! Calling this multimedia is even a bit of a stretch—even with a few QuickTime movies, it's just a CD-ROM. To add injury to insult, there's even an old version of QuickTime on the disc. This could otherwise be a decent and useful disc to have; it's just the wrong place and time.

The other included disc is the Multimedia Starter CD. Joe's definitely going to feel insulted with this one. True, it's more genuinely multimedia, but the content is so inane, basically QuickTime ads for Apple and linear passive stories about interactive multimedia, and the design is so lame that Joe would do better if he just stuck it in the microwave for some real interactive entertainment.

This is definitely one of those projects that used to contribute to the "Gee whiz, a computer can do that!" factor back in the dark days of 1992. Now that we know that, it's time Apple bundled something fun with the Multimedia Kit. In the meantime, anyone buying a CD-ROM drive should pick up some decent CD-ROMs at the same time in order to avoid total disillusionment when they get home and set up their new system. ■

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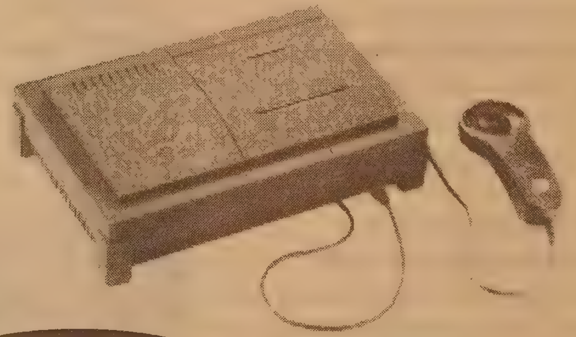

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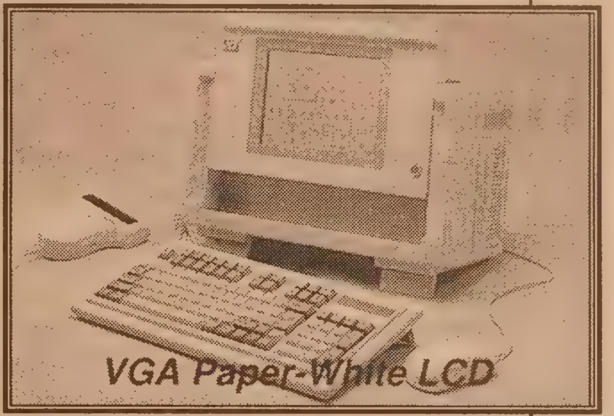

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Gulch Gossip

By Jonathan E.

Marc **Canter** and the **MediaBand** have released their first interactive visual/music CD-ROM, Meet MediaBand.

I'll say more about it in the next Multimedia 101 column, but briefly and in the meantime, if you want to catch up on what's the state of the art in musical CD-ROM products, this is it. As anyone who knows Canter's history or has seen him demoing the product knows, Canter is a master showman and a leading contender for being the visionary to actually turn multimedia into a cultural force.

The only cautionary note I'll sound is that publicity in the music business is a slippery beast, and that poor timing can make it real easy to fall through the cracks. This is a music product as much as a computer product—and I'm far from convinced that the publicity machine is up to speed on that side.

Anyway, get your own copy for $60 from 1-800-387-0201.

▼ ▼ ▼ ▼ ▼

Instead I went to "A Swinging '60s Discotheque" at the **Hotel Utah**, hosted by **Nancie S. Martin** and **Jouissance Productions** to show off the two **Rhino/Compton**'s CD-ROMs about **Atlantic**'s soul and rock music of the '60s. Originally scheduled for pre-Christmas release, the date has now been pushed back to early 1995 due to some slowness in the licensing procedures for a few videos and interviews. The party drink was a strange fluorescent green "psychedelic" punch that appeared to have absolutely no effect.

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Tony Bove also reports some stupidity and reluctance from the music business in licensing matters with difficulty in getting rights to some **Hendrix** clips for his history of the Haight-Ashbury title. MCA wants to do its own exclusive title on Hendrix and figures that he should be excised from everybody else's histories.

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Tim Boyle of the **Multimedia Development Group** called the Seventh Annual Multimedia Expo at Moscone "our county fair"; I might characterize it as more of a flea market. Nobody seemed very impressed by the exhibits, although there were a few diamonds in the rough: the aforementioned MediaBand being one; **Live Oak**'s "Four Paws Of Crab" with picnic hamper display of Thai food ingredients, **Imaja's Bliss Paint**, and the CD-ROM magazine, ***Visionary Stampede***, produced by the students of nine Bay Area high schools, being others. The rest of it was mostly a bedraggled collection of "been there, done that" big technology companies and a few small start-ups interspersed along with ancillary services.

Nevertheless, publicists **Ken Margolis** and **Billy James** hosted an amusing little party at the **Icon Byte Bar & Grill** where there was much loose talk and assorted merriment. **Sylvia Paul**, cyber-scribe, conducted a provocative survey of people's attitudes about S&M in her alter-ego role as agent provocateur, but with no readily apparent results.

Michael Gossney wasn't sure at the beginning of the evening whether he'd present the Digital Be-In next year, but soon decided to go ahead with it and announced the venue as the International Maritimers Hall at 3rd and Harrison—a big improvement over the Fashion Center; the date is still uncertain.

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Other stories also emerged, not the kind for attribution and not the kind that'll find official confirmation—but juicy. Try these on for size: The **Intel** ad that flies you through the computer was done on Macintoshes. ... **BMG** thought they'd bought the worldwide non-American rights to **Rocket Science**'s games, went ahead and printed stationery with the Rocket Science logo on it, only to find out that Sega had already bought the Japanese rights. Oops!

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Wired is doing direct mail testing on its subscription price, reportedly looking at a one-year sub as low as $19.97, almost $20 below its current sub price. Glossy stock is also a possibility. You don't think they're getting rattled by ***Computer Life***, do you?

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And talking of *Computer Life*, **Fred Davis**'s column keeps going through name changes because all the good ones are already taken. It was initially called "Gizmo," but that had to be retired when it turned out that ***Popular Science*** already had it. In an attempt to come up with something so dumb that nobody else would use it, "Techno-Rama" was next, but not dumb enough. It looks like "Buzz-O-Rama" may be sufficiently unsmart to stick.

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Pity the poor publicist working for the **Terpin Group** who had to call about the History of Western Civilization CD-ROM and announce, "There's a bug. You can't open it, but we've shipped it anyway."

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And yes, apparently **AT&T** is interested in **Apple**.

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Away from such idle gossip, I ran into **Fabrice Florin**, one of my original multimedia mentors, at the Mill Valley Film Festival. He's now left Apple and is working as an independent. He says he'll have news to announce on his new titles "in about a month or so." In the meantime, he can still be reached at the same number as before, (415)777-9896.

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Substance.digizine looks set to have its second issue out on schedule in late November. A Mac version is promised for January.

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Conversion of **Peter Gabriel**'s Xplora 1 CD-ROM from Mac to MPC-compatible proceeds slowly over in England's green and pleasant land. Reportedly, it's not as easy a process as hoped, partially due to its HyperCard front-end and also due to the file-naming conventions used or not used, as the case may be. Christmas delivery hangs in the balance.

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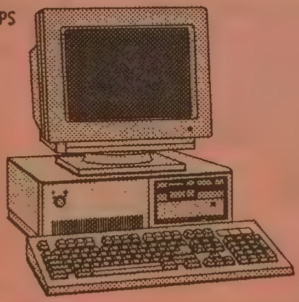

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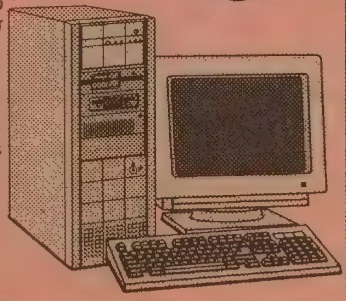

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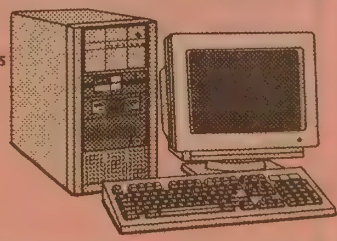

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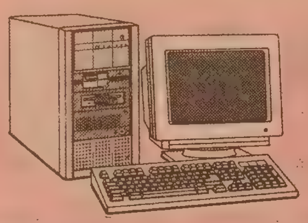

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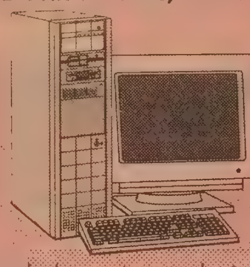

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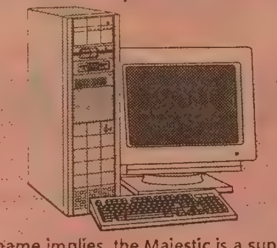
MAJESTIC AMI Atlas VIP

Adaptec 2940W, Matrox MGA Plus



As the name implies, the Majestic is a superior system. It integrates the finest made motherboard, controller, Video and monitor. It also features the Fast & Wide technology to achieve DTR of 20MB/sec burst and 5MB/sec sustained. Ideal for complex video and audio multimedia applications where uninterrupted data transfer is essential.

- Intel **Pentium** 90/100MHz Processor 16K Cache
- **AMI Atlas VIP** PCI/VESA/ISA 64-bit motherboard
- 256KB Write back static cache
- **16MB** 72-pin 70ns RAM up to 128MB
- 1.0GB **Fast & Wide SCSI-2 Fujitsu** 9ms Hard Drive
- **Adaptec 2940W or Qlogic** RISC Based PCI Fast Wide SCSI-2 Controller **(20MB/sec DTR)**
- 1.44MB High Density Floppy Drive
- 17" **IDEAK** .26dp 1600x1280 Monitor
- **Matrox MGA Ultima Plus** with 2MB Video RAM Option: **ATi Mach64** or **ViperPro SE**
- Deluxe Full-tower Case w/ 300W PS Dual Fans
- 101 Enhanced **Key Tronic** keyboard
- **Microsoft** Ergonomic mouse
- DOS 6.22 and Windows 3.11 w/ Manuals
- 4-Years Parts Warranty

$4495

Things That Make You Go Hmmmm!!! #3

NexGen processor based systems will soon start popping up in ads, and often will cost $200 less than a comparable Intel Pentium system. What's the catch? Three main differences between the two chips: 1) Pentium has the FPU (Math-CO) built-in, Nx586 has it optional; 2) Unlike the Pentium, Nx586 has On-chip L2 cache controller; 3) Nx586 has 32KB integrated cache, while Pentium has only 16KB. Since the Nx586 is 100% compatible with all the x86 software bases, we believe it is a good choice for applications that do not need the FPU. Our Nexus system incorporates the Nx586 processor.

SCSI interface comes in more than one standard. Basically, all provide the same function, but differ in performance. The SCSI standards are: SCSI-1 (1986) had 8-bit bus running at 5MHz clock, therefore provided the max. DTR of 5MB/sec. The Popular SCSI-2 (1992) is similar to SCSI-1 except for the capability of having wider buses and higher clock rates. With fast SCSI-2 the clock is 10MHz with 8-bit bus i.e. having 10MB/sec DTR. With fast & Wide SCSI-2 the clock is still at 10MHz but the bus is 16-bit which provides 20MB/sec DTR. With fast/Wide SCSI-2 requires special 68-pin cable. Many of our high-end Pentium systems incorporate the Fast/Wide technology.
(Note: some Quantum hard drives are described as Fast SCSI-3, which is NOT the same as Fast/Wide SCSI-2!).

In a Symmetrical MultiProcessor (SMP) system running a 32-bit operating system such as Windows NT, UNIX MP, Solaris and OS/2, multiple operations can run virtually simultaneously. Because of the embedded features of multi-threading and symmetric multiprocessing in these OS's, during execution of an application, the OS divides tasks into independently executable threads, executed by an available CPU, therefore, improving the performance of the system dramatically. In Single processor systems on the other hand, multitasking is achieved by alternately executing instruction from two or more applications, sliced into very short time periods, thus giving the effect of running concurrently. We're currently offering machines that can incorporate the SMP technology.

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High-end Pentium based Workstations and Servers

SUPERSTATION

Single Pentium 90/100MHz
EISA/PCI 64-bit Architecture
2.1GB Fast & Wide Barracuda
20" ViewSonic Monitor

- Intel **Pentium 90/100MHz** Processor 16K Cache
- **AIR** EISA /PCI 64-bit Motherboard
- 512K KB Write back static cache
- 16MB 72-pin 70ns RAM up to 128MB
- 2.1GB **Seagate** Fast Wide SCSI-2 9ms
- Built-in Fast Wide SCSI-2 **(20MB/sec DTR)**
- 1.44MB High Density Floppy Drive
- 20" **ViewSonic** 20 1600X1280 .28dp Monitor
- **Diamond Stealth64** 4MB VRAM Video
- **GT-300** Case 300W PS Triple Fans w/ doors
- 101 Enhanced **Key Tronic** keyboard
- 4-EISA/ISA and 4-PCI Slots
- **Microsoft** Ergonomic mouse
- DOS 6.22, Windows 3.11 w/ manuals

90MHz $5995

SERVER MP

Dual Pentium 90/100MHz
AMI/ASUS or Micronics board
EISA/PCI 64-bit Architecture
4.2GB Fast & Wide Barracuda

- **Dual Intel Pentium 90 /100MHz** Processors
- One **P54C** and one **P54CM** Pentium Processors
- **AMI/ASUS or Micronics** 64-bit Motherboard
- EISA/PCI 64-bit Neptune SMP Architecture
- 512KB Write back static cache up to 1MB
- 32MB 72-pin 60ns RAM up to 384MB
- **Mirrored 2x 2.1GB Seagate** Fast Wide SCSI-2 9ms
- **Adaptec 2940W** Fast Wide SCSI-2 (20MB/sec)
- 1.44MB High Density Floppy Drive
- 14" SVGA .28dp Color Monitor
- SVGA 1MB Video Card
- **Server** Case **350W** PS Triple Fans w/doors
- 101 Enhanced **Key Tronic** keyboard
- 4-EISA/ISA and up to 4-PCI Slots
- **Microsoft** Ergonomic mouse

Dual 90MHz $8295

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Massive SMP Architecture
Up to 16 Pentium processors
Fault Resilient System
Upgradability to P6 Processor

This extraordinary file server enhances your ability to move and use information in your most demanding and mission critical on-line transaction processing (OLTP). This server provides exceptional upgradability. It can expand via quadratic (Quad) processor boards which allow up to four CPUs per board to a total of 16 CPUs. The server also provides superior data-management features to prevent data loss or corruption, such as, RAID, uninterrupted power supplies and LifeKeeper software. This server is ideal for Enterprises such as financial institutions, where real-time and on-line transaction is the essence of their survival.

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- Upgradeable to P6 Processor
- 4MB L2 Cache per each processor
- 128MB to 4GB ECC 2/4 interleaving
- 400MB/sec bandwidth on bus
- Up to 112GB of hot pluggable internal storage
- 56 Fast & Wide SCSI Channels @ 20MB/sec each
- Super VGA interface with 1MB RAM
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- Huge size tower case (56x34x28 in.)
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- Power Fail Recovery/Battery Backup
- Redundant power supply
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- 8/16 port serial adapters
- LifeKeeper FRS software

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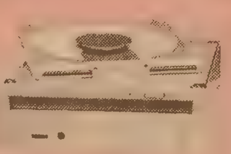

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- Sound Blaster 16 Value
- Labtec amplified Speakers

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- Sound Blaster 16 ASP SCSI-2
- Altec Lansing ACS-50

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☞ **MAPS**

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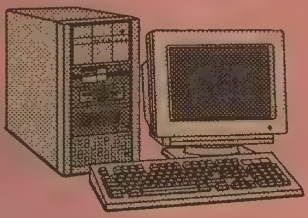
RISC MIPS R4400 and DEC 275Mhz Alpha

275MHz Alpha Processor The Fastest Processor on earth! 17" ViewSonic 17 Monitor

There are three main features that describe this machine: 1)Speed 2)Speed 3)Speed. That is right, this amazing Alpha machine can fly through the most complicated tasks at fraction of a second.



. True 64-bit **Alpha AXP** Processor
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. 16MB 72-pin 60ns RAM up to 512MB
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. **Toshiba** 3501 **Quad** Speed CD-ROM
. Integrated Fast SCSI-2 controller
. 17" **ViewSonic** 17 .27dp NI Monitor
. **ATi Graphics** Ultra Pro 2MB VRAM
. Tower Case with 300W Power Supply
. 101 Enhanced Keyboard
. 2.88MB FDD, PS/2 Mouse
. 3-PCI and 3-ISA Expansion Slots
. Windows NT **Daytona** (Option OSF1)

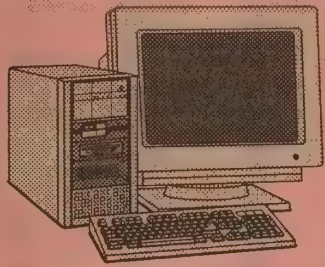
ALPHA GENERATION

digital

200MHz $6,795
233MHz $7,695
275MHz $8,195

Dual RISC R4400 Graphics/NT SuperStation-NEC RISC 2000 21" NEC 6FGp Monitor

When Microsoft looked for a hardware to develop NT, guess what they chose? You bet, it was the NEC MIPS RISC machines. Now you can get those same machines from us directly and save a bundle.



. Dual **NEC VR 4400MC** MIPS RISC Processors
. 75/150MHz Processor Speed
. 512KB Secondary Cache per CPU
. 16MB ECC Memory on 128-bit bus
. **Micropolis** 1.0GB Fast SCSI-2 9ms
. **NEC 3Xi** Triple Speed SCSI-2 CD-ROM
. Integrated 64-bit LB Fast SCSI-2 interface
. 21" **NEC 6FGp** Flat 1280X1024 Monitor
. 64-bit Local Bus **Jaguar** Video 2MB VRAM
. Tower Case with 260W Power Supply
. 101 Enhanced Keyboard
. 1.44MB FDD, PS/2 Mouse
. Windows NT **Daytona**

NEC

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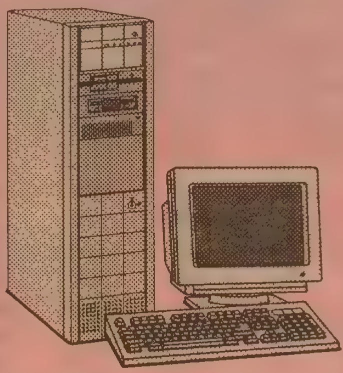
Dual RISC R4400 Super NT Server-NEC Express RISCServer



. Dual **NEC VR 4400MC** MIPS RISC Processors
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. 1MB Secondary Cache per CPU
. 64MB ECC Memory on 128-bit bus
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. **NEC 3Xi** Triple Speed SCSI-2 CD-ROM
. Integrated 64-bit LB Fast SCSI-2 interface
. 14" **NEC 3V** NI .28dp Monitor
. 1MB SVGA Video Card
. Tower Case with 350W Power Supply
. 101 Enhanced Keyboard
. 1.44MB FDD, PS/2 Mouse
. **14.4/14.4K** Baud Fax/Modem
. Windows NT **Daytona**

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. ExaByte int. 5GB	$2099
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- 3-Year warranty
- 24-hour Courier service

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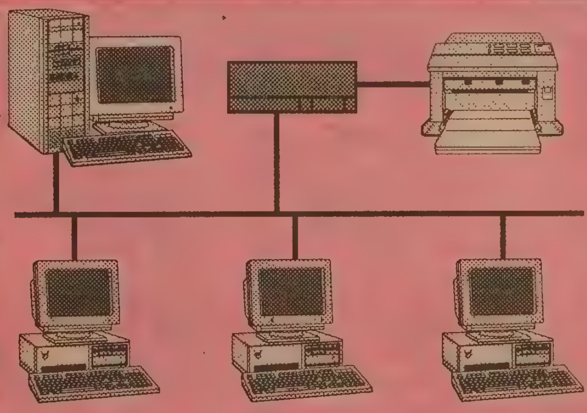

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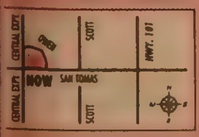
6. **30-days satisfaction money back guarantee**



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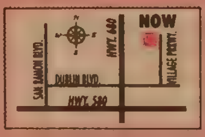

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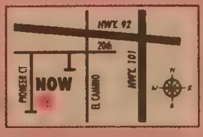

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PENTIUM -66/256C VLB PCI USA	268	768	1,058	1,278	1,318	1,348	1,448	1,488	1,448	1,198
PENTIUM -60/256C VLB PCI USA	268	648	928	1,148	1,188	1,218	1,318	1,358	1,318	1,078
PENTIUM -90/256C VLB PCI	258	838	1,118	1,338	1,378	1,408	1,508	1,548	1,508	1,548
PENTIUM -90/256C PCI	218	798	1,078	1,298	1,338	1,368	1,468	1,508	1,468	1,508
PENTIUM -66/256C VLB PCI	188	688	968	1,188	1,228	1,258	1,358	1,398	1,358	1,398
PENTIUM -60/256C VLB PCI	188	568	838	1,058	1,098	1,128	1,228	1,268	1,228	1,268
GENOA 486DX2-66/256C PCI	178	348	508	848	768	798	898	938	1,018	1,058
GENOA 486DX2-66/256C VLB	118	278	428	768	688	718	818	858	938	978
GENOA 486DX-33/256C VLB	118	218	378	718	638	668	768	808	888	928
IBM 486BL-75/256C VLB	N/A	224	374	714	634	664	764	804	884	924
IBM 486SLC2-66/64C VLB	N/A	148	298	638	558	588	688	728	808	848
486DX2-66C VLB	68	234	370	710	630	660	760	800	880	920
486DX-50C VLB	68	232	368	708	628	658	758	798	878	918
486DX2-50C VLB	68	178	318	658	578	608	708	748	828	868
486DX-40C VLB	68	172	304	644	564	594	694	734	814	854
486DX-33C VLB	68	164	298	638	558	588	688	728	808	848
486SX-25C VLB	68	124	260	600	520	550	650	690	770	810
486DLC-40/128C VLB	84	134	284	624	544	574	674	714	794	834
486DX2-66/128C NICE EISA VLB	188	398	548	888	808	838	938	978	1,058	1,098
486DX-33/128C NICE EISA VLB	188	328	478	818	738	768	868	908	988	1,028
486DX2-66C ISA	58	228	368	708	628	658	758	798	878	918
486DX2-50C ISA	58	168	308	648	568	598	698	738	818	858
486SX-33C ISA	58	134	278	618	538	568	668	708	788	828
486SX-25C ISA	58	108	258	598	518	548	648	688	768	808
486SLC-40 ISA	N/A	98	248	588	508	538	638	678	758	798
486SLC-33 ISA	N/A	88	238	578	498	528	628	668	748	788
386DX-40/128C	N/A	82	220	560	480	510	610	650	730	770
386SX-40	N/A	58	208	548	468	498	598	638	718	758

* **BASIC SYSTEM:** Motherboard & CPU, 1MB RAM (4MB for Pentium Systems), IDE with I/O, 1.44MB FDD, Case with Power Supply, and 101-Key Keyboard.

BEST MULTIMEDIA SYSTEMS

- 4MB RAM (**8MB for Pentium Systems**)
- 1.44MB 3.5" Floppy Drive
- VLB IDE controller w/2S/1P/1G
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- Microsoft Compatible Mouse w/Pad

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486DX-40/128K VLB $1,098
486DX2-50/128K VLB...$1,108
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Pentium-60/256K VLB ..$1,668
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UPGRADES

- Microsoft Windows 3.11................Add $50
- 420MB Hard Drive..........................Add $30
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- 1.0GB Hard Drive..........................Add $300
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486DX-40/128K ISA / VLB........818 / 828
486DX2-50/128K ISA / VLB ......828 / 838
486DX2-66/128K ISA / VLB ......878 / 888
IBM 486SLC2-66/64K VLB 798
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486 DX-33/128K NICE EISA VLB 978
486DX2-66/128K NICE EISA VLB 1,068
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GENOA 486DX4-100/256K VLB 1,278
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Pentium P5-60/256K VLB - PCI 1,388
Pentium P5-66/256K VLB - PCI 1,528
Pentium P5-90/256K PCI.............1,628
Pentium P5-90/256K VLB - PCI 1,648
Pentium P5-60/256K VLB - PCI USA1,478
Pentium P5-66/256K VLB - PCI USA1,598
Pentium P5-90/256K VLB - PCI USA1,688

SYSTEM CONFIGURATION

- Motherboard w/CPU
- 4MB RAM (**8MB for Pentium**)
- 340MB Fast Hard Drive
- 1.44MB 3.5" Floppy Drive
- IDE 2HD/2FD Controller w/2S/1P/1G
- 512KB SVGA Card
- 14" SVGA .28 Color Monitor
- 101-Key Enhanced Keyboard
- Enhanced Case w/Power Supply
- Microsoft Compatible Mouse w/Pad
- Microsoft DOS 6.2x

BEST BUY

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- Microsoft Windows 3.11 ....Add $50
- 420MB Hard Drive.......................Add $30
- 540MB Hard Drive.......................Add $70
- 1.0GB Hard Drive.......................Add $300
- 14" Non-Interlaced Monitor ....Add $10
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- Double Speed CD-ROM w/Card .Add $120
- Sound Blaster Pro Value Edition ..Add $72
- CD Deluxe Pak (4 Titles)..............Add $14

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- **1 MB Video Memory**
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- **NiMH Battery**
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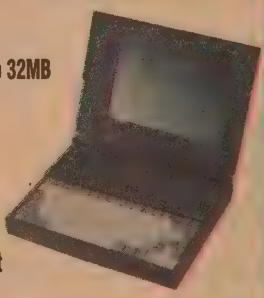

BEST BUY

Super Sales	VGA Mono	Dual Scan Color	Active Matrix Color
486SX-33	$1,378	$1,818	$2,728
486DX-33	1,418	1,898	2,778
486DX2-50	1,438	1,918	2,798
486DX2-66	1,498	1,978	2,858
486DX4-100	1,828	2,298	3,198

UPGRADES

- Microsoft DOS 6.21.......................Add $40
- RAM 8MB / 16MB ....Add 240 / 700
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2742T EISA (Twin SCSI)	258
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Fax Modem (14,400/14,400) for Notebook	114
Hayes 14400 Fax Modem Int/Ext	**104 / 124**
PCMCIA Fax Modem (14400) for Notebook	**118**
US Robotics	
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Stealth 64 PCI 4MB (VRAM)	408
Viper 2MB (VLB)	**244**
Viper SE 2MB (PCI)	**244**
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Orchid	
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Kevlin ISA 1MB	119
Kelvin EZ PCI / VLB VLB 1MB (DRAM)	**94 / 94**
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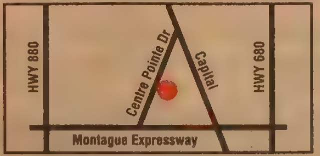

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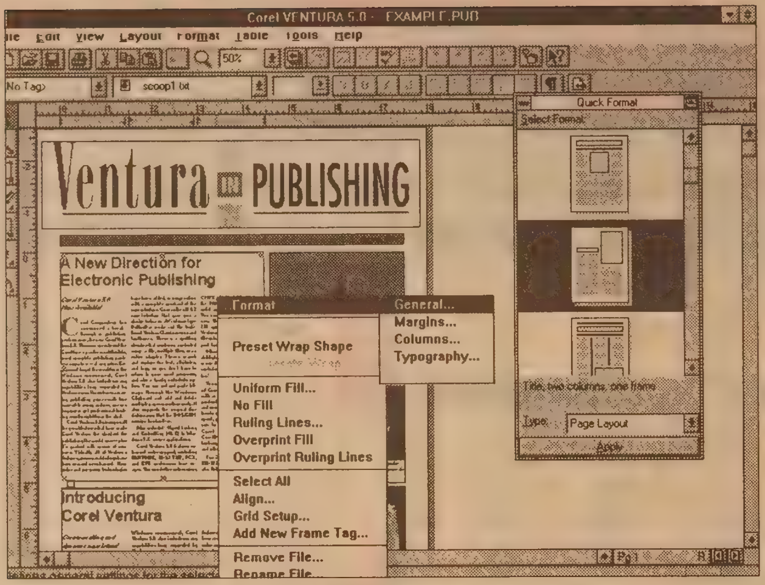
High-End Desktop Publishing Packages For Windows

A Comparative Survey


Corel VENTURA 5.0 - EXAMPLE.PUB
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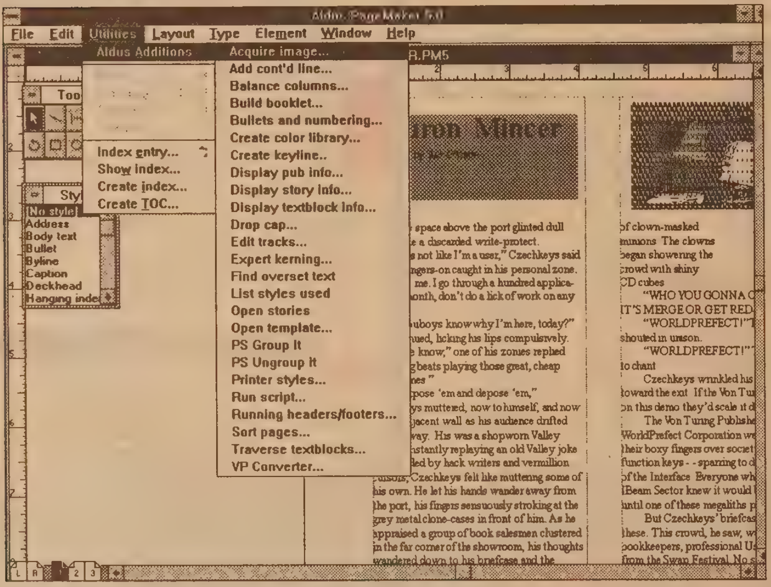
Quick Format
Select Format:
Ventura PUBLISHING
A New Direction for Electronic Publishing
Introducing Corel Ventura
Format
Preset Wrap Shape
Uniform Fill...
No Fill
Ruling Lines...
Overprint Fill
Overprint Ruling Lines
Select All
Align...
Grid Setup...
Add New Frame Tag...
Remove File...
Rename File...
General...
Margins...
Columns...
Typography...
Title, two columns, one frame
Type: Page Layout
Apply
Pg 1

CORELDRAW


Aldus PageMaker 5.0
File Edit Utilities Layout Type Element Window Help
Aldus Additions
Acquire image...
Add cont'd line...
Balance columns...
Build booklet...
Bullets and numbering...
Create color library...
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Display pub info...
Display story info...
Display textblock info...
Drop cap...
Edit tracks...
Expert kerning...
Find overset text
List styles used
Open stories
Open template...
PS Group It
PS Ungroup It
Printer styles...
Run script...
Running headers/footers...
Sort pages...
Traverse textblocks...
VP Converter...
Index entry...
Show index...
Create index...
Create TOC...
R.PM5
Too
Sty
No style
Address
Body text
Bullet
Byline
Caption
Deckhead
Hanging inde
ron Mincer

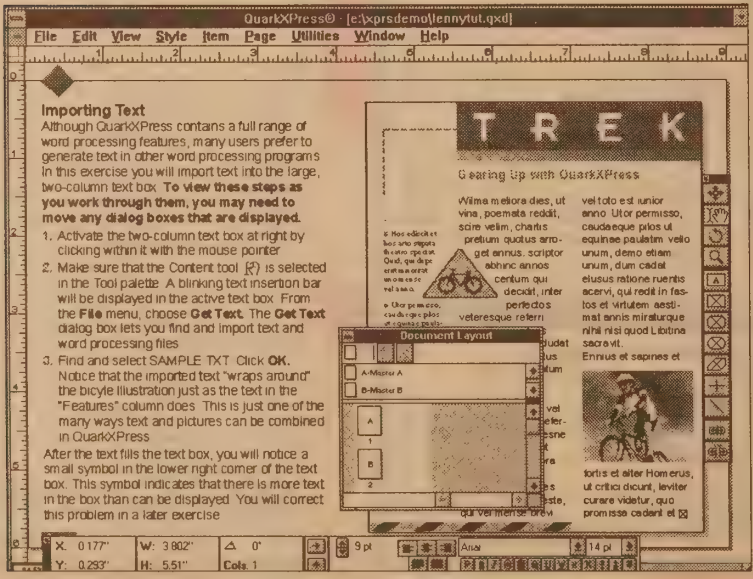
space above the port glinted dull
e a discarded write-protect.
s not like I'm a user," Czechkeys said
ngers-on caught in his personal zone.
me. I go through a hundred applica-
onth, don't do a lick of work on any

uboys know why I'm here, today?"
ued, licking his lips compulsively.
e know," one of his zones replied
g beats playing those great, cheap
nes."
pose 'em and depose 'em,"
ys muttered, now to himself, and now
jacent wall as his audience drifted
way. His was a shopworn Valley
nstantly replaying an old Valley joke
led by hack writers and vermillion
ulsors, Czechkeys felt like muttering some of
his own. He let his hands wander away from
the port, his fingers sensuously stroking at the
grey metal clone-cases in front of him. As he
appraised a group of book salesmen clustered
in the far corner of the showroom, his thoughts
wandered down to his briefcase and the

of clown-masked
minions. The clowns
began showering the
crowd with shiny
CD cubes
"WHO YOU GONNA C
IT'S MERGE OR GET RED
"WORLDPREFECT!"
shouted in unison.
"WORLDPREFECT!"
to chant
Czechkeys wrinkled his
toward the exit. If the Von Tu
on this demo they'd scale it d
The Von Turing Publishe
WorldPrefect Corporation w
their boxy fingers over societ
function keys - - sparring to d
of the Interface. Everyone wh
IBeam Sector knew it would
until one of these megaliths p
But Czechkeys' briefca
these. This crowd, he saw, w
bookkeepers, professional U
from the Swan Festival. No s

PAGEMAKER

QUARK EXPRESS


QuarkXPress® - [e:\xprsdemo\lennytut.qxd]
File Edit View Style Item Page Utilities Window Help
T R E K
Gearing Up with QuarkXPress
Document Layout
A-Master A
B-Master B
X: 0.177"
Y: 0.293"
W: 3.802"
H: 5.51"
0°
Cols: 1
9 pt
Arial
14 pt

Importing Text
Although QuarkXPress contains a full range of word processing features, many users prefer to generate text in other word processing programs. In this exercise you will import text into the large, two-column text box. **To view these steps as you work through them, you may need to move any dialog boxes that are displayed.**

1. Activate the two-column text box at right by clicking within it with the mouse pointer.
2. Make sure that the Content tool is selected in the Tool palette. A blinking text insertion bar will be displayed in the active text box. From the **File** menu, choose **Get Text**. The **Get Text** dialog box lets you find and import text and word processing files.
3. Find and select SAMPLE.TXT. Click **OK**. Notice that the imported text "wraps around" the bicyle illustration just as the text in the "Features" column does. This is just one of the many ways text and pictures can be combined in QuarkXPress.

After the text fills the text box, you will notice a small symbol in the lower right corner of the text box. This symbol indicates that there is more text in the box than can be displayed. You will correct this problem in a later exercise.

Wilma meliora dies, ut vina, poemata reddit, scire velim, chartis pretium quotus arrogat annus. scriptor abhinc annos centum qui decidit, inter perfectos veteresque referri

vel toto est iunior anno. Utor permisso, caudaeque pilos ut equinae paulatim vello unum, demo etiam unum, dum cadat elusus ratione ruentis acervi, qui redit in fastos et virtutem aestimat annis miraturque nihil nisi quod Libitina sacravit.
Ennius et sapines et

fortis et alter Homerus, ut critici dicunt, leviter curare videtur, quo promissa cadant et ☒

The state of the art in desktop publishing changed very little during the past year. But changes now visible on the horizon may presage a shift in the "Big Three" balance of power.

With the failure of Xerox's Ventura Publisher to successfully make a transition to the Windows and Macintosh platforms, QuarkXPress supplanted PageMaker in 1994 as the number one high-end DTP package. This was due largely to Quark's superior handling of large documents, its precision controls, and the added flexibility of its interface.

In the past two years, the advent of low-end DTP packages like Microsoft Publisher, and the evolution of word processing packages like WordPerfect and Microsoft Word, have established a new, specialized niche for the more expensive Quark and PageMaker. In 1993, high-end desktop publishing programs developed sophisticated color-management features, and a series of special add-on enhancements to offset the competition from low-end packages.

Now Corel Corporation has reentered Ventura Publisher into the competition, with an enhanced, greatly improved version that may escalate the competition between the high-end survivors in the market. After almost a year of nothing but maintenance upgrades from Aldus and Quark, we may soon see new versions of their products that try to catch up to Corel's substantial interface and feature innovations.

The advantages that the "high-end" desktop publishing packages offer over "low-end" packages and smart word processors are their

BY LENNY BAILES

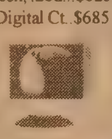
PARAMOUNT COMPUTER of EAST BAY

MONITORS

KFC

CT1428C 14" Green, 1024x768 N/I 28d	$225
CT1511 15" 1280x1024 Flat Screen, .28d	$305
CT1507 15" 1280x1024 Green, Digital Ct.	$365
CT1712 17" 1280x1024 Flat Screen, .28d	$625
CT1718 17" 1280x1024 Green, Digital Ct.	$685

MAG



MX15FG 15" 1280x1024, Lo-Radiation	$435
DX15F 15" 1280x1024, FlatScreen	$358
MX17FG 17" 1280x1024, Lo-Radiation	$819
DX17F 17" 1280x1024, FlatScreen	$645

NANAO

F340i w 15" non-int , flat screen	$call
F550i 17" non-int, 1280x1024, .28dpi	$829
F550i w 17" non-int, 1280x1024 ,28dpi	$915
F560i w 17" AKA "The Green Monitor"	$1149
T560i 17" non-int, 1280x1024, .25dpi	$call
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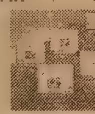
ViewMagic



CA-1464E/SP 14" 1280x1024 N-I	$265
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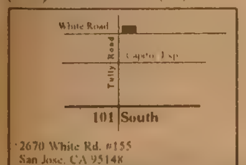

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automation and control of specialized page layout and printing tasks. If you want to produce a magazine with eye-catching graphics, multiple colors, and special layout effects, the high-end packages make it easier to place elements on the page, designate specific color separations and ink combinations, adjust the appearance of type, manipulate the sequence of story-text in the publication, generate running page-headers, and place graphics directly from your scanner. QuarkXPress and Ventura Publisher are also particularly wellsuited to the production of technical manuals and book-length manuscripts.

What you don't need high-end DTP packages for, anymore, is the mom-and-pop newsletters and brochures that originally spurred so many DTP sales. There are now quite a few word processors and low-end packages that will do the job for a home user at considerably less expense.

For those who seek professional-level publishing tools, each of the "Big Three" DTP packages has its particular strengths and weaknesses.

PAGEMAKER 5.0

Pros: PageMaker has the simplest engine of the three packages. It's easier to master all the options. The features don't always have the depth of control that Quark or Ventura offer, but they're easy to find and easy to apply.

Standout features in the basic package include three-level index generation, and six different color management systems. Benefits offered in PageMaker additions are the ability to generate running page-headers, sort pages and build custom booklet formats, and expert tracking/kerning options.

Cons: PageMaker is the least able of the three to handle the production of longer documents; its text autoflow feature works only on full-page blocks. PageMaker has no built-in support for two-color gradient fills, and a meager collection of pattern fills. Fills and built-in image controls apply only to black-and-white bitmaps; they don't work on greyscale or multicolor graphics. The package has no built-in footnote feature (footnotes must be typed in manually on a page-by-page basis).

PageMaker is the classic interface for desktop publishing. It consists of a page display and pasteboard area onto which you can construct or import various layout elements. The left and right master pages are used to place repeating elements that will appear in all pages of a publication.

Story text is placed on the page by importing a file composed in a word processor, typing text directly onto the page, or using PageMaker's Story Editor. Smaller text "stories" are normally placed on a page-by-page basis by clicking with the selection tool and dragging out the size and shape of the text block on each successive page. A large story can be placed automatically, but only into full-page text blocks. Any other layout arrangement must be composed by turning to each successive page and manually arranging the size and shape of the text block.

The story editor contains a series of word processing features, allowing you to perform spell-checks, search and replace text, or give specific formatting instructions (font, paragraph style, type style, etc.). Spell checking can be performed algorithmically or from a specified hyphenation dictionary. Seventeen document templates for newsletters, brochures, address lists, labels, etc. are included in PageMaker's "Open Templates" addition.

The package includes a series of other "Additions" enhancements accessed from PageMaker's "Utilities" menu. The Additions include a number of useful supplementary features for text management, color management, graphic management, and typographic control.

The basic PageMaker features include standard paragraph stylesheets, sixty-five import filters, a table editor that can import and manipulate Excel and Lotus 1-2-3 spreadsheets, and a toolbox that can draw simple lines, ovals, and rectangles, as well as skew text and graphics.

OLE 2.0 linking is supported for files from Windows-compatible applications. (On the Mac, PageMaker also supports the System 7 Publish and Subscribe features.) The package includes an online user tutorial that covers DTP basics, and a series of "getting started" manuals and a command-reference. The documentation is well written and attractively laid out.

Note: Although the package does not include filters for Word for Windows v6 or Excel v5, these can be downloaded from the Aldus BBS, along with a nifty Addition that automatically converts Ventura Publisher v3/4 files into PageMaker publications.

COREL VENTURA PUBLISHER 5.0

Pros: Great user value: base-package includes seventeen thousand clip art images; 650 fonts; seventy-five style sheets and templates; Adobe Acrobat Reader; a pared-down version of Ares FontMinder (an excellent font management utility); and a series of other Corel Applications, Mosaic (a graphic file manager), PhotoPaint (a bitmap image design program), DB Editor and QUERY (a database manager and table-generation tool), Equation Editor, and Corel Kern.

Improved interface featuring pop-up menus and roll-up dialog boxes. Amazing built-in color fills, special effects, line and box drawing features. More zoom document views than either competitor. More supported import/export formats (including latest versions of Word, WordPerfect, Excel, etc.), powerhouse table-editing, footnotes. Style sheets and style tags for paragraphs and underlying frames.

Cons: More intricate interface, contains a multitude of fine-tuning controls that may cause some right-brained designers to space out. Still edits only one document at a time. Requires 8MB of RAM, minimum (Corel suggests 16MB). Graphic frames all on one layer (send-to-front/send-to-back works only for lines, polygons, and boxes) .

Corel Ventura 5 turned out to be a pleasant surprise for me. In the days of the GEM interface and Ventura v3, this was my favorite computer program of all time, bar none. In the words of Corel's accompanying PR release: "For years Xerox Ventura Publisher was king of the desktop publishing industry, known for its power to creative structured, text-intensive documents...but neglect by its previous owner, Xerox Desktop Software, and a poor port to Windows tarnished its crown: width tables made font management difficult, there were too many non-Windows keystrokes for common commands, too many menus to do simple tasks... Xerox never fully adopted the Windows interface to its GEM-based Ventura Publisher."

With v5, Corel has revised and greatly improved Ventura's interface, banishing the troublesome width tables, and including state-of-the-art features that may have Adobe/Aldus and Quark scrambling to keep up. The confusing icon toolbars of v4.2 have been replaced by a useful toolbar that is clearly captioned with pop-up function descriptions (similar to Microsoft's Word for Windows, or Apple's Balloon help).

Ventura Publisher has always included more options and text adjustment features per square inch than any competing product. The plethora of nested menus and dialog boxes has been supplemented in this version by convenient "roll-up" tool bars—a very Xerox/Macintosh-like innovation. Corel also makes good use of the right mouse button, allowing you to click anywhere on the screen and pop up a portable menu of context-sensitive options. The pull-down menus themselves now use the same tabbed dialog boxes that Microsoft developed for Word and Windows '95.

The underlying metaphor in Ventura Publisher is to draw or generate "frames"—containers for text or graphic material, which are placed automatically after the underlying document structure is established. The designer can then go back and make minute manual adjustments to the layout. The idea with Ventura is to preload the text files and graphics that you intend to use in a publication and pour them into a document one-by-one from list boxes within Ventura's editing screen.

Version 5 continues the shifted emphasis of the last two versions toward complete publication files that can contain a large number of

RESOURCES:

PageMaker 5.0, $895
Aldus Corporation
411 First Ave. South
Seattle, WA 98104
(206)622-5500

Corel Ventura 5.0, basic package $595/diskettes, $495/CD-ROM, with CorelDRAW $895/diskettes, $695/CD-ROM
Corel Corporation
1600 Carling Ave.
Ottawa, Ontario, Canada
K1Z8R7
(613)728- 8200

QuarkXPress v3.3, $895
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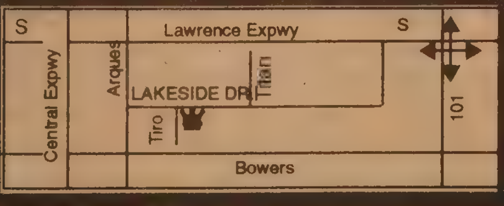

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individual chapters. The program default is now to open and work with publication files, rather than individual chapter files.

Corel Ventura has also caught up with a few other features from its competitors. Text can be set to flow around irregularly-shaped objects either manually or in six preconfigured patterns. The Quick Format roll-up is more flexible than Quark's Document Layout Palette, allowing you to quickly change document templates, column formats, colors, or paragraph styles from a floating toolbar. The Ventura color separation utility is fully integrated into the base package, allowing a choice of four color management systems. The online tutorial features ten complete lessons, and is more extensive than the tutorials bundled with PageMaker and Quark.

Corel Ventura now includes both display and printer calibration utilities that allow you to synchronize the colors of your monitor and printer to the closest possible color match for Pantone, TruMatch, or FOCOLTONE catalog systems. The full range of fill options available in CorelDRAW is also available in the Corel Ventura toolbox, even if you don't own a copy of DRAW. (This was, to me, the most impressive feature of the new release.) Users can also elect to buy Corel Ventura 5 in an integrated bundle from Corel that includes CorelDRAW and and its attendant supplemental applications: CorelTRACE, CorelCHART, CorelSHOW, CorelMOVE, and twenty-two thousand pieces of clip art.

Note: Corel Ventura 5 requires a minimum of 8MB of RAM. On the 16MB Pentium system I used as a test base, response time was more than satisfactory, but I suspect that on an 8MB 486, performance may be less than brisk.

QUARKXPRESS, V3.3

Pros: Extends PageMaker's easy-to-use pasteboard metaphor with multiple master page templates and a series of document and tool options. Offers fine control (to thousandths of a point) of text and graphic placement on the page.

The package is well suited to poster design, with all-caps, shadow, outline, and strike-through styles provided in addition to standard typestyle options. The drawing tools include irregular polygon construction. Quark also has the best tools for color trapping in the industry. (See the sidebar glossary for details.)

Cons: Instead of a full-course meal, Quark is strictly a la carte. In order to have a number of basic text-management and layout tools, you must purchase additional third-party "XTensions."

The basic Quark has no support for creating headers and footers, creating footnotes, generating an index or table of contents, editing tables or spreadsheets, establishing cross-references, or figure captions. All of these tasks require individual XTensions that cost from $100 to $300 apiece. Quark is targeted toward high-end special niche markets, so it includes no clip art or document templates with the package. Import filters available from third parties are not yet available for current versions of some popular PC applications (Excel 5, AMI Pro 3.0, Word for Windows v6).

QuarkEXPress is a hybrid of some of the best features of PageMaker and Ventura Publisher, which may partially account for its growing popularity on both PC and Macintosh platforms. To the basic page and pasteboard, Quark adds the ability to pour elements into underlying "text boxes" and "graphic boxes." Unlike PageMaker, Quark permits text to flow automatically from a box of any size or location on the master page to automatically duplicated boxes on successive pages.

The Quark Control Palette allows fine placement of text and graphic boxes by typing in coordinates. The Control Palette also provides quick access to typestyles, paragraph alignment, and the box rotation feature. "Runarounds" (text-wrap around irregular objects) adjust themselves automatically as you move a graphic box around on the page.

Quark paragraph styles are edited on a more piecemeal basis than comparable styles in PageMaker and Ventura. Instead of setting all paragraph defaults from a single dialog box, you must successively choose a series of pull-down menu options to modify a style. (The most important ruler and spacing defaults are included in one menu item, but baseline adjustment, character fonts, and tab settings are all specified from separate individual pull-down choices.)

The individual tools in the Quark toolbox are all highly adjustable. Sophisticated users may pre configure the size and shape of element boxes, and modify the defaults of the content and drawing tools.

Without third-party extensions, Quark can import and establish links to objects from OLE 2.0 compliant applications in graphic boxes, rather than as editable data. Hyphenation decisions are made by algorithm, rather than dictionary, although you can set up a special exceptions dictionary to complement the general hyphenation algorithm. Quark has no story editor, per se, as do PageMaker and Ventura, but you can run a spell-check, and it's easy to search and replace text or font codes within individual text boxes.

Quark currently supports more management systems for process and spot colors than its competitors. It can print separation plates containing all colors used in a document, or produce plates one color at a time. (PageMaker and Corel Ventura both allow you to print partial plates that contain more than one specified color.)

Perhaps the strongest feature of the package is its ability to superimpose up to 127 master pages over a document. This allows a designer to quickly modify the appearance of a document, and easily produce a series of variations on short notice. ■

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Desktop Publishing Glossary

LAYOUT

Master Page: A control page which duplicates all placed graphics, text, and other layout elements on each page of a document. Ventura Publisher doesn't use master pages. PageMaker permits two per publication, and Quark Express lets you switch among up to 127 different templates.

Runaround: The ability to make text flow around an inserted graphic in a natural and symmetric way. PageMaker, Ventura Publisher, and Quark all now possess this feature. Quark creates the simplest, most automatic runarounds—Ventura Publisher includes a number of preset runarounds to flow text in interesting geometric shapes. PageMaker, once the champ at this maneuver, now has the most cumbersome implementation.

Template Document: A preformatted sample document that can be used to create a specialized publication like a newsletter, brochure, or technical report. Template documents usually include specific column settings with placeholders for graphics and headlines. Ventura Publisher currently offers the widest variety of template documents.

TYPOGRAPHY

Tracking: The ability to vary the space between individual characters and words in a specific font.

Kerning: The ability to alter the space between pairs of characters in headlines and chapter titles to make text look more natural or pleasing to the eye. High-quality PostScript fonts often include special kerning tables from the designer to improve the appearance of specific character combinations. All three packages permit these values to be used when present, edited, or manually overriden. PageMaker has the strongest support for kerning and tracking, with many options, including an expert override feature in its additions.

GRAPHICS

Tints: Different shades of a single color (the color mixed with varying percentages of white) are called tints.

Process Color: To reproduce scanned photographs and images accurately, their colors are "processed" and divided into different tints of four different inks, cyan, yellow, magenta, and black.

Spot Color: In addition to process colors, all three reviewed packages allow you to designate colors based on premixed inks. There are several industry-standard systems for specifying exactly the color you want by a common catalog number. (Pantone Matching is the most widely used of the standards.) All three packages include the ability to specify whether your documents will be printed using process colors or spot colors and to convert spot colors into their process equivalents. PageMaker and Ventura Publisher allow you to print partial separations with a combination of colors. Quark can print either all of the separations or one at a time.

Gradient/Fountain Fill: A non uniform color background for a graphic used to reflect lighting and other special effects. Ventura Publisher includes a wide variety of these fills. Quark allows you to create solid and gradient fills that blend a pair of colors, and PageMaker is limited to solid fills of one color or a limited number of monochrome cross-hatch designs. (Quark does not include any bitmapped pattern designs.)

Trapping: When two objects of different colors in a publication overlap, the one specified as the top layer usually "knocks out" a portion of the underlying object. Because of registration problems in printing, gaps sometimes occur at the intersection boundaries of the two objects. Trapping is a technique for extending or shrinking one of the objects to create a small over-printed area of intersection. This area is assigned a color blended from the individual colors of the two objects. Quark and Ventura include automatic trapping features. All three packages have tools to allow sophisticated users to manually set up a color trap. ■

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Riding The HighWire With Faxmodems

Working in multimedia today means good communication skills as well as a steady hand on the cursor. You need to be able to share text and visual information with production team members, clients, publishers, and suppliers quickly and easily.

If you're ready to buy your first modem, or are thinking about an upgrade, here are two factors you should consider: maximum data communications speed and faxmodem capability. Just as more and more media workers in graphics, desktop publishing, and pre-press are replacing bike messengers with modems to be able to instantly transmit documents at any time, so too are more multimedia producers beginning to walk the wires. One of the best examples of just how high-res that route can go was demonstrated when Steven Spielberg was transmitting dailies and rough-cuts of *Schindler's List* and *Jurassic Park* between Poland and Los Angeles so that he could do approvals on the spot instead of waiting between air couriers.

MODEMS, BAUD, AND SPEED

Way back when I was shopping around for a modem for my souped-up Mac Plus, I was just about ready to buy a 1200 baud (or bps—bits per second) modem, when a communications professional advised me to go for a 2400 baud-capable model. Since most of the online services at that time maxed out at 1200, and many bulletin boards were still chugging along at 300, 2400 seemed a tad over the top.

But—always having faith in progress—I chose the higher rate with a Hayes. Within a year later, 2400 was in the passing lane and 1200 was seeing taillights. The higher the speed rate, the less time it takes to send and receive files, and the richer the information can be.

Today, The WELL, eWorld, America Online, and most other online services can accommodate 9600 baud, and—with the rush to the Internet—some services are already introducing 14.4 (CCITT V.32bis, or 14,000bps). You will really need that speed and bandwidth to be able to accommodate all those neat features you hear about, like Mosaic, gophers, high-resolution graphics, color, sound, and motion documents.

Even if you aren't interested in the multimedia side of the Net, you also need higher rates to score those nodes and search and retrieve in the thousands of cyberlibraries and databases out there. And make sure that the unit you choose is a V.34 class modem, which supports the worldwide standard.

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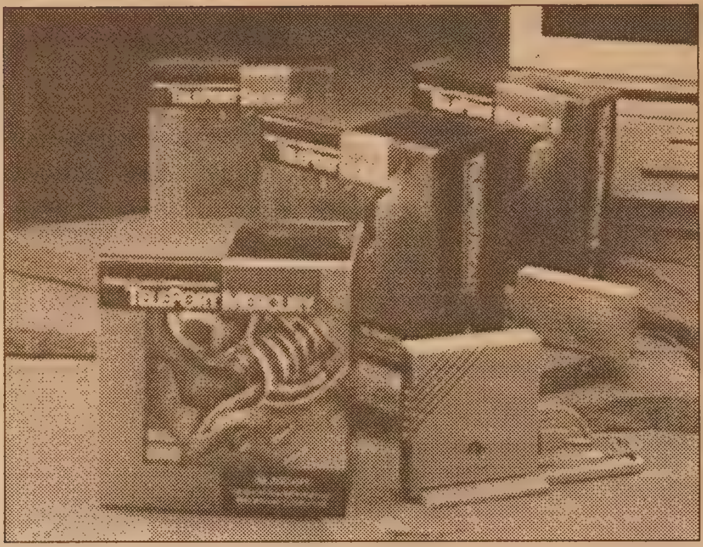

VIRTUAL TREES

A faxmodem is a data modem that has the extra electronics and the supportive software that let it emulate the datastream of fax. A faxmodem operates as a data modem as well.

This means that your computer can become a "virtual" fax machine, able to send, receive, and read true fax signals and output them as hardcopy from a printer if need be. You can receive any fax as a document. Then you can manipulate, integrate, store, or trash it solely as an electronic document without ever touching paper. (How many times have you created a document on the screen, printed it out, brought the sheet of paper over to the fax machine, and then sent it out as a fax?)

The major difference in sending from a faxmodem is that the source message must already be in electronic form. This means that anything you see on your screen—text, a map, a photograph, a spreadsheet, a diagram—can be sent as a page of fax. A word processing page will not be received as a document that can be edited within the recipient's word processing program. It's more like a screen capture of a page—a graphic document. Thus, as an electronic document, it can be displayed and manipulated within a graphics program if you want to erase areas and paste in other elements.

If you want to send a paper document, you need to use a scanner to translate the information into an electronic document. A fax machine is, after all, an efficient package that combines the components of a scanner, a copy machine, a modem, a telephone, and a printer into one box.

You may already be taking advantage of the ability of many communication software packages that allow you to send an ASCII, text-only message from your computer through MCI Mail or other online service, so that someone who has a fax machine, but not a computer, can receive that message as a paper fax. I depend upon that medium very often when someone wants something on paper right away. I don't have to write the document, print it out, and mail it, or find a fax machine.

This is fine as long as you don't need any other formatting or graphic element, such as a map or a company letterhead. The reason it's difficult (if not impossible) to send a message from a faxmodem through an online service, and enjoy that economy over the long distance phone lines, is that a fax signal is different—"thicker"—than a straight text-only data message. The same goes for sending email from one service to another—like from AppleLink to CompuServe. It, too needs to be text-only. When sending within services, like from one AppleLink user to another, then you can send an attached document, like one from Word, DeskDraw, or Director, and it will arrive intact.

After using a faxmodem for a while, paper fax begins to look very wasteful. How many cover sheets do you save? How many faxes? Now if everyone just used email, all of this would be even more economical and faster.

PEDAL TO THE METAL

I have been using a Global Village Communication Teleport/Mercury faxmodem for the Macintosh, and with consistently good results. It has a maximum datacom speed of 19,200bps (V.32terbo) and a maximum fax data send and receive speed of 14,400bps (14.4). The Global Village faxmodems have often been at the top of the connectivity category in *MacWEEK*'s monthly Index of Top Sellers.

The Gold, Silver, and Bronze Teleports street for about $320, $239, and $89 respectively. PowerPorts, for PowerBooks, are less. You can get a faxmodem card for a PC box for well under $100 through mail order.

For the Mac, and full-featured faxmodems, the fax function adds about $80+ to an equivalent data modem. Modems are commodity items, but reliability is present in greater degrees in the better packages. The Mercuries and the Golds, for instance, are based on an AT&T chipset, and the Bronzes on a Rockwell. You get what you pay for on the InfoPaseo, too.

The choice of an internal faxmodem card or an external standalone unit may be driven by desktop space concerns or by slot envy. If you are a multimedia producer, you will probably want an external faxmodem, like the Teleports, since every NuBus slot may be critically needed for some medium or another, such as audio, video capture, and accelerator boards. Internal faxmodems, like Global Village's PowerPorts for Apple PowerBooks, can certainly save space for laptops on the move.

But it's the software that differentiates faxmodem products as much as the hardware. This is why the Global Village line has done so well. The software was really coded from the ground up to serve fax functions, rather than added as an enhancement of an existing telecom software package. The Global Village's GlobalFax software takes care of all of the functions you would need, such as modem checks, address books, logs, and a little progress bar that appears in your menu header bar, and functions for other telecom actions in your Mac as well. Unfortunately, you must be within the active application of the document you are faxing from. You can't just select a document from the desktop the way you can from a data modem program.

The package also includes ZTerm software, which is an easy-to-use telecommunications program. It has all of the dialects that are needed (XMODEM, YMODEM, ZMODEM, etc.) to communicate with other PCs, mainframes, and online services.

FAX/OCR: READING BETWEEN THE LINES

With an optical character recognition (OCR) function in the faxmodem support software, it is possible to receive fax documents and convert them back into editable text. Instead of printing out the fax and running it through a scanner and an OCR program, you can do it within the faxmodem software with Global Village's GlobalFax OCR. You just select the OCR button at the bottom of the window.

Like OCR everywhere, GlobalFax OCR is a very memory-intensive process, and you may have to quit out of any other programs to give the OCR function enough memory to process. Just as not every font on every page will always OCR well on a scanner, the fax experience distorts text even more. Most fax pages will OCR through without a hitch, whereas others may be hopeless. Overall, it is a boon—the next best thing to email. ■

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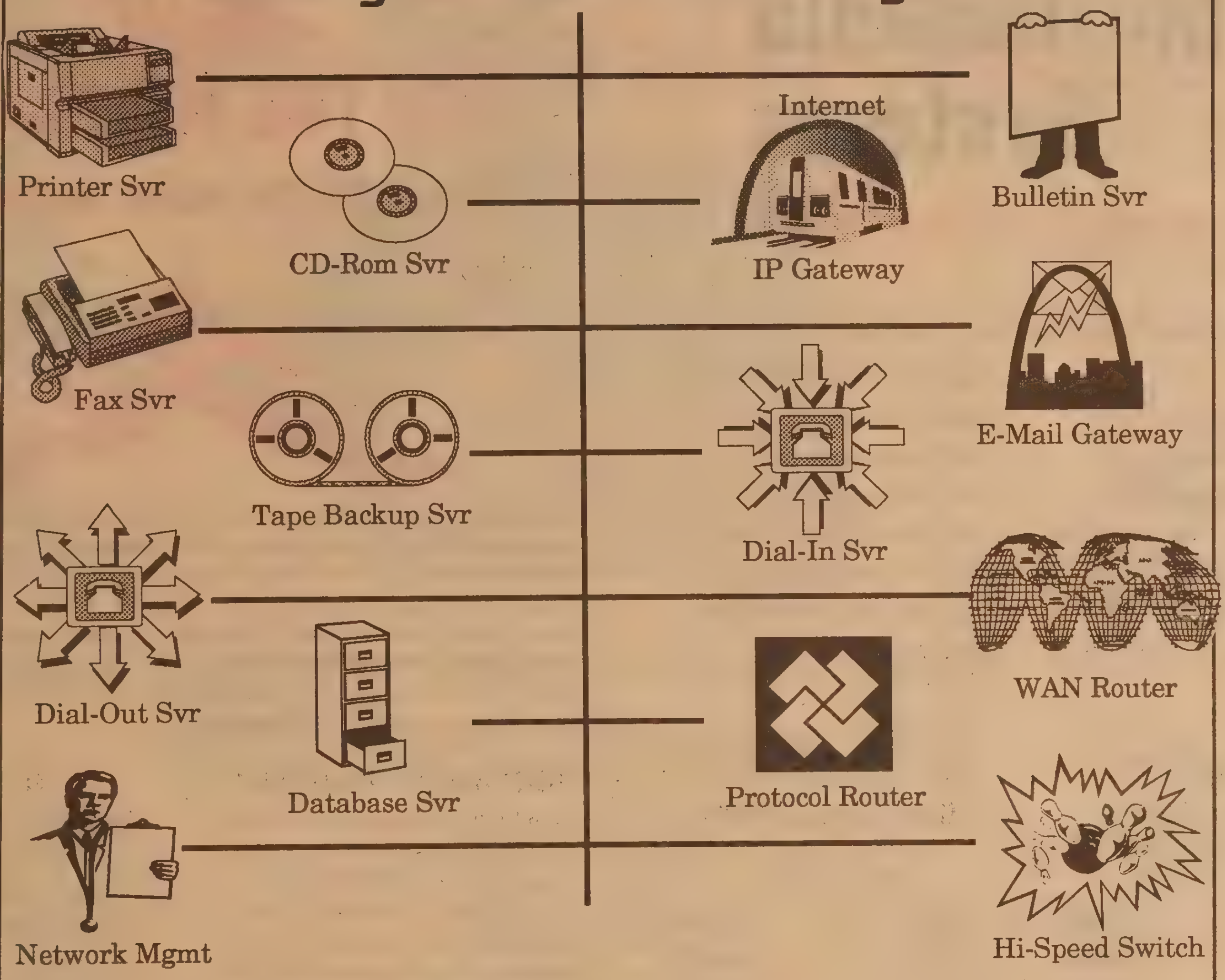
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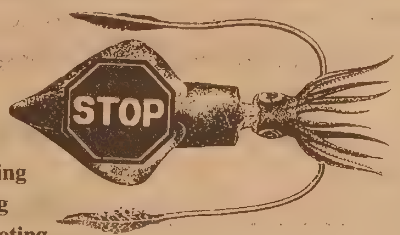

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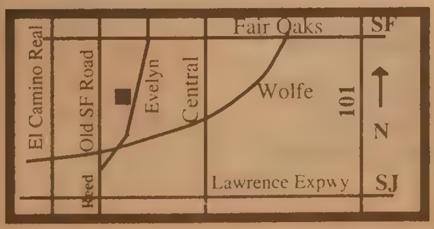
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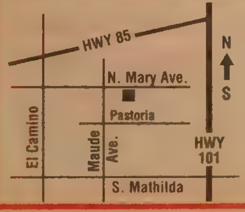

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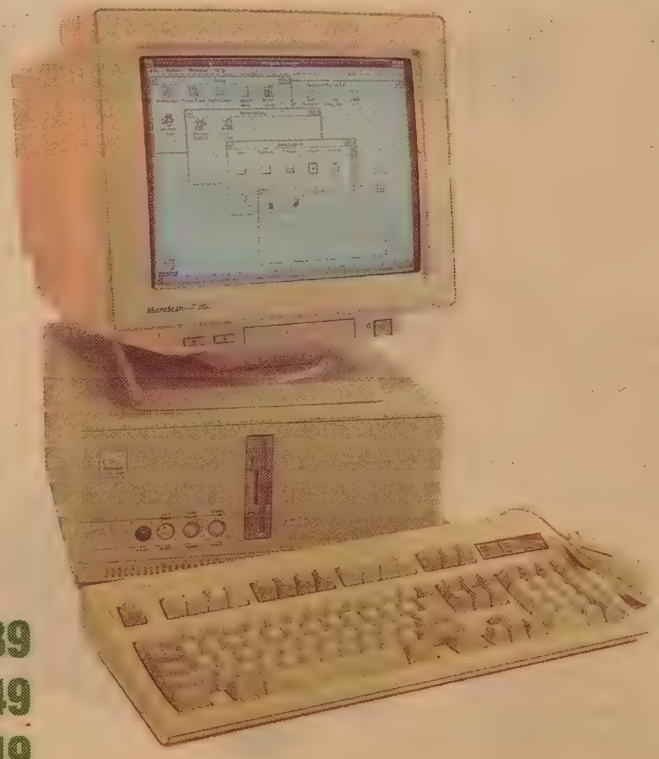

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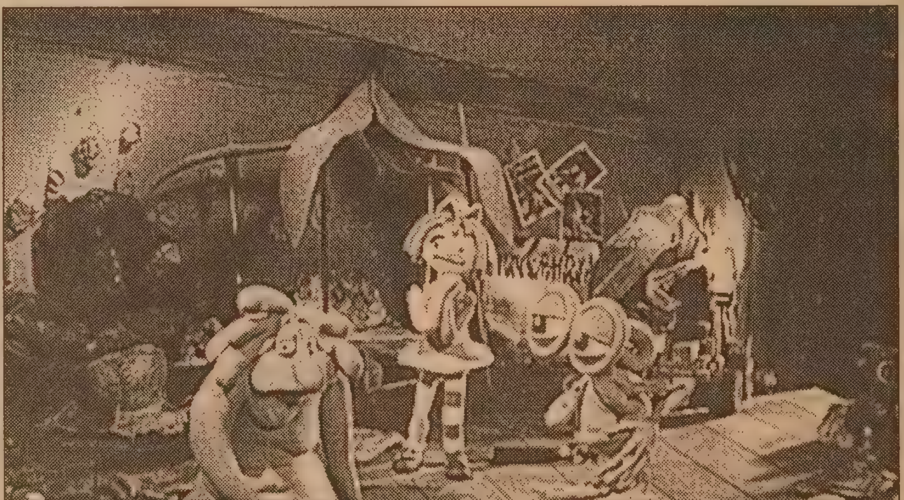
Bump In The Night

Danger Productions Blends Traditional Stop-Motion Animation Techniques With Computer Technology To Create This New TV Show For Kids.

Hiding behind a conservative business park suite in Brisbane lies a 35,000-square-foot labyrinth of movie sets bustling with imagination and activity. Add to this a prop shop along with editing and sound studios and you will find yourself at Danger Productions. *Bump in the Night,* the show currently being crafted here, is the newest entry in the field of animation art known as stop-motion. To create this new TV show for kids, Danger Productions blends traditional stop-motion animation techniques with computer technology.

There are eighteen animators and approximately eighty employees working full-time to create the *Bump in the Night* series for the ABC Fall Saturday morning lineup. The show is based on the adventures and misadventures of Mr. Bumpy and Squishy, who are foot-high characters that inhabit a family's home. In one episode, "Made in Japan," a disappointingly small prize arrives in the mail. The "Turbo-Totronoid" is really a transforming robot who grows big and intimidating when frightened, sad, or homesick. But only Squishy can see the robot looming large; the other characters see just the dinky toy. The tale follows the boy-who-cried-wolf tact until finally they decide, much to the little doll's happiness, to send her back to her home in Osaka. In another episode, "Adventures in Microbia," the characters go through a microscope, become small, and have adventures with the germs.



THE CHARACTERS MR. BUMPY, SQUISHY AND MOLLY FROM BUMP IN THE NIGHT. *Courtesy Danger Productions*

WHAT IS STOP-MOTION?

Stop-motion is the art of photographing a puppet or other inanimate object one frame at a time—moving that object a tiny bit for each successive frame. When the film is assembled and played back the character appears to move seamlessly, as if alive. The term for this type of animation is quite often improperly mixed: LIVE-ACTION go together but STOP-ACTION do not. The correct phrase is STOP-MOTION.

Stop-motion animation techniques have been around almost as long as the motion picture camera. George Pal introduced Americans to this puppetry art form in the 1930s with features such as *Tubby the Tuba.* Ray Harryhausen used it in *Jason and the Argonauts* in 1963. More recently, in 1990, animator Nick Park of England's

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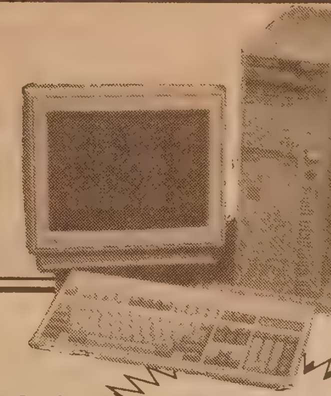

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Aardman Animations won an Academy Award for *Creature Comforts.* The success experienced by Park and others, such as Will Vinton, creator of the California Raisins, and Tim Burton, creator of *The Nightmare Before Christmas*, has helped spur a revival in stop-motion.

USING COMPUTERS IN THE PRODUCTION PROCESS

The traditional techniques for making stop-motion animation are still used predominately but computers facilitate and enhance the process at almost every step of the way. Early in the production process at Danger Productions, Microsoft Word is used for writing the script. The storyboard artist then conceptualizes the whole piece from the script and breaks it into storyboard scenes, which become a visual script. These are grouped into separate packets which are placed on a wall in a bamboo-roofed room called the "tiki hut." The animators work from these packets of drawn instructions for creating their assigned "scenes."

> "This is the biggest stop-motion animation production ever attempted for a Saturday morning TV show."
>
> —Alex Hansen, Technical Director, Danger Productions

A Macintosh computer and monitor are connected to the video camcorder on the set where filming is taking place. Alex Hansen, the technical director, created custom frame-grabber software in C programming language for the RasterOp video capture card. With the touch of a computer key, one frame, or live shot, is grabbed. This shot can be viewed with the three previous shots, which are held in a buffer. This allows the animator to check for movement continuity before recording the shot to the final output, a 35mm film camera. They know exactly what has been filmed, which saves costly reshooting expenses. The storyboard is also filmed with the frame-grabber and turned into an animatic, a running storyboard with the soundtrack attached on videotape. This is used to guide the overall production and timing of the piece to see how sets and characters are working together visually. As scenes are shot on film and completed, the storyboard version is gradually replaced by the actual stop-motion footage until all of the scenes are completed.

MOTION CONTROL

The Kuper System, from Kuper Controls, is motion-control software that drives special motors, called stepper motors, that control camera movement. It is programmed to make camera moves such as pans, trucks, and zooms and to follow focus automatically. In other words, the camera operator can define a camera move via the software without a person having to manually move the camera frame-by-frame. For example, the camera operator wants to film a particular shot from point A to point B, and to make that shot in a certain amount of time, such as three seconds. By means of a jogbox, or remote control, the camera can be programmed to do this. "One application for motion-control is that it enables us to match moves from live-action full-size sets and then replicate them on a miniature studio set," said camera operator Mike Beanstock.

SOUND

The voices are recorded in a Los Angeles studio. The dialogue is broken down phonetically by people called "track readers." The characters are animated to match the soundtrack. Other sound effects, like screeches or ringing phones or whatever, can be added to the animation as needed. "With all the sound effects available on both DAT (digital audio tape) and CD," said sound engineer James Allen, "you can go through libraries, pull effects, and place them into a workstation. With SMPTE time code the computer can be used to track the sound effect and match it with video." For video editing they use an Avid, a Mac-based digital editing system. Using SMPTE time code, which is a way of tracking each frame of film by the time-stamp attached to it, the audio and images can then be edited and combined to create the master.

PROP AND PUPPET CONSTRUCTION

The prop shop, where all the puppets and props are designed and built, is filled with props and various objects. Elise Robertson, character department supervisor says, "The fabrication area is a lot like a giant toy box. Many props are built from scratch and every day we face a unique set of design problems. I have to ask, 'How can we build this object so that it can be animated?'"

Many props are built from everyday objects. For example, the pages of a book can be animated by stringing wire inside the book. Or a portable TV will be gutted, painted day-glo pink and redesigned with swirly, stylistic dials. Other things, like chocolate chip cookies, are made from clay and painted. Many of the puppets are first sculpted the traditional way in clay, then cast in plaster molds. Some puppets are soft and made of foam latex from an injection mold. For *Bump in the Night*, Mr. Bumpy has an internal wire armature while Molly has an internal ball and socket type armature. Molly's facial expressions are changed by using a sticker chart of replacement mouths. Some of the puppets have different eyelids for animating each eye position as open, closed, or in between.

"This is the biggest stop-motion animation production ever attempted for a Saturday morning TV show," says Alex Hansen. With a multi million-dollar budget, Danger Productions has been working exclusively for over a year on this twenty-six-week series. It is produced by Ken Pontac and David Bleiman. Some of their past work includes the creation of videogames such as Harley's Humongous Adventure, Clayfighters 1 and 2, and an ABC primetime pilot, *The Danger Team.*

It must be emphasized that the craft of making the characters move, step by step, has not changed much; and while it is indeed a time-consuming process, yielding about minutes of finished animation a week, it is not at all tedious, as it has often been described. It is rather, like many other art forms, a labor of love. It takes the talent and efforts of many people working together to breath life into a stop-motion production. There is a special magic and reward when the film is played and each hand-crafted movement comes to life.

The series *Bump in the Night* premiered Saturday September 10 on ABC at 9 am PST. The half-hour show's format consists of one 11-minute, one 7-minute short story, and a 3-minute musical segment.■

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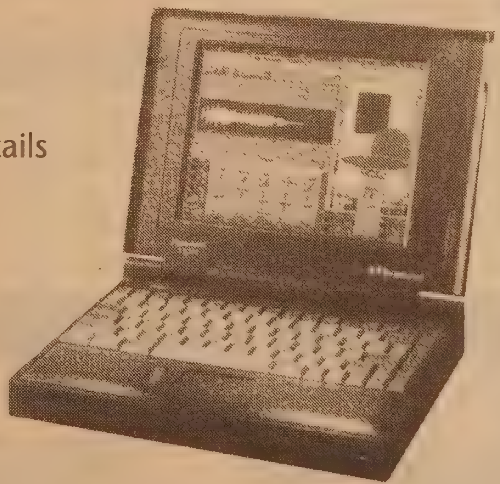
- Active Matrix Color Display
- 8MB RAM, 500MB Hard Drive
- Integrated TwinTouch™ Pointing Device
- Monochrome Model Available, Call For Details



New TwinTouch™ pointing device, a Slimnote exclusive, is the next step beyond trackballs. Moving the cursor is as easy and intuitive as moving your finger. TwinTouch comes standard on Model 5100 and as an optional upgrade on the 550S and 550T.

Don't settle for tinny 8-bit sound. Slimnote gives you vibrant 16-bit stereo, with two speakers and a microphone built right in. It's the multimedia machine that fits in your briefcase!

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PACKAGE 1 SYSTEM

486 VLB Series

- ☑ Biostar Motherboard w/ CPU (256K Cache)
- ☑ 4Mb Ram installed
- ☑ IDE Controller VLB 2HD & 2FD w/ 2s, 1p, 1g
- ☑ Floppy Drive 1.44Mb
- ☑ Hard Disk 420Mb IDE 12ms
- ☑ Window Accelerator VLB w/1Mb
- ☑ 14" Super VGA Color Monitor (1024x768) .28 NI
- ☑ 101 Keys Enhanced Keyboard
- ☑ Mini Tower Case w/ 230 Watts Power Supply
- ☑ **Free 3 Buttons Serial Mouse**

Cyrix 486DX2-50	**$928**
AMD 486DX-40	**$958**
AMD 486DX2-66	**$998**
AMD 486DX2-80	**$1,098**
Intel 486DX-33	**$918**
Intel 486DX2-50	**$978**
Intel 486DX2-66	**$1,018**

PACKAGE 2 SYSTEM

486 VLB Series

- ☑ SIS-471 Motherboard w/ CPU (256K Cache)
- ☑ 4Mb Ram installed (72-pin)
- ☑ IDE Controller VLB 2HD & 2FD w/ 2s, 1p, 1g
- ☑ Floppy Drive 1.44Mb
- ☑ Hard Disk 420Mb IDE 12ms
- ☑ **Spider+ Window Accelerator VLB w/1Mb**
- ☑ **14" Acer 34T SVGA Color Monitor (1024x768) .28 NI**
- ☑ 101 Keys Enhanced Keyboard
- ☑ Mini Tower Case w/ 230 Watts Power Supply
- ☑ **Free 3 Buttons Serial Mouse**

Cyrix 486DX2-50	**$968**
AMD 486DX-40	**$998**
AMD 486DX2-66	**$1,048**
AMD 486DX2-80	**$1,148**
Intel 486DX-33	**$958**
Intel 486DX2-50	**$1,028**
Intel 486DX2-66	**$1,068**

PACKAGE 3 SYSTEM

486 VLB Series

- ☑ SIS-471Motherboard w/ CPU (256Kb Cache)
- ☑ 4Mb RAM Installed (72-pin)
- ☑ IDE Controller VLB 2HD & 2FD w/ 2s, 1p, 1g
- ☑ Floppy Drive 1.44Mb
- ☑ Hard Disk 420Mb IDE 12ms
- ☑ **Orchid Celsius VLB w/ 1Mb VRAM**
- ☑ **15" Acer 56L SVGA Color Monitor (1024x768) .28 NI**
- ☑ 101 Keys Enhanced Keyboard
- ☑ Mini Tower Case w/ 230 Watt Power Supply
- ☑ **Free 3 Buttons Serial Mouse**

Cyrix 486DX2-50	**$1,148**
AMD 486DX-40	**$1,178**
AMD 486DX2-66	**$1,218**
AMD 486DX2-80	**$1,328**
Intel 486DX-33	**$1,138**
Intel 486DX2-50	**$1,198**
Intel 486DX2-66	**$1,238**

PACKAGE 4 SYSTEM

Pentium VLB Series

- ☑ Opti Motherboard w/ CPU & Heatsink (256Kb Cache)
- ☑ 8Mb RAM Installed (72-pin)
- ☑ IDE Controller VLB 2HD & 2FD w/ 2s, 1p, 1g
- ☑ Floppy Drive 1.44Mb
- ☑ **Hard Disk 540Mb IDE 12ms**
- ☑ Windows Accelerator VLB w/ 1Mb
- ☑ 14" Super VGA Color Monitor (1024x768) .28 NI
- ☑ 101 Keys Enhanced Keyboard
- ☑ Mini Tower Case w/ 230 Watt Power Supply
- ☑ **Free 3 Buttons Serial Mouse**

pentium PROCESSOR

P5-60MHz	**$1,518**
P5-66MHz	**$1.668**
P5-90MHz	**$1,818**

PACKAGE 5 SYSTEM

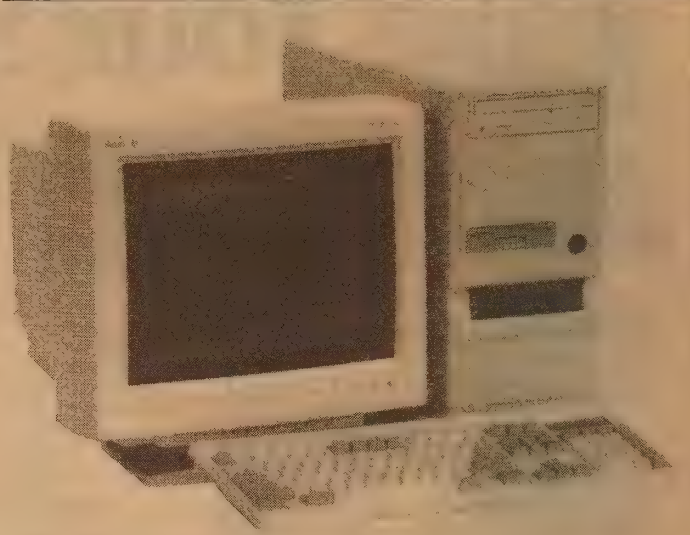
Pentium PCI Series

- ☑ Intel Motherboard w/ CPU & Heatsink (256Kb Cache)
- ☑ 8Mb RAM Installed (72-pin)
- ☑ IDE Controller PCI 2HD & 2FD w/ 2s, 1p, 1g
- ☑ Floppy Drive 1.44Mb
- ☑ **Hard Disk 540Mb IDE 12ms**
- ☑ **Windows Accelerator PCI w/ 1Mb (S3-864)**
- ☑ **15" Acer 56L SVGA Color Monitor (1024x768) .28 NI**
- ☑ Keytronic 101 Keys Enhanced Keyboard
- ☑ Medium Tower Case w/ 230 Watt Power Supply
- ☑ **Free Microsoft Serial Mouse (Ergomonic)**

intel. pentium PROCESSOR

Intel P5-60MHz	**$1,758**
Intel P5-66MHz	**$1,898**
Intel P5-90MHz	**$2,028**

486 MULTIMEDIA SYSTEM



- ✱ SIS-471 Motherboard w/ CPU (ZIF socket)
- ✱ 256K Cache
- ✱ 4Mb Ram installed (72-pin)
- ✱ IDE Controller VLB 2HD & 2FD w/ 2s, 1p, 1g
- ✱ Floppy Drive 1.44Mb
- ✱ Hard Disk 420Mb IDE 12ms
- ✱ Sigma Design Concorde VLB w/ 2Mb (ET4000-W32i)
- ✱ 15" Acer 56L SVGA Color Monitor (1024x768) .28 NI
- ✱ 101 Keys Enhanced Keyboard
- ✱ Super Mini Tower Case w/ 230 Watts P.S
- ✱ Microsoft Serial Mouse
- ✱ Discovery CD-16 Multimedia Kit

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AMD 486DX2-80	**$1,548**
Intel 486DX2-66	**$1,468**

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ISA 386DX-40 w/ 128Kb + CPU	$85
VLB Opti 386DX-40 w/ 128Kb + CPU	$118
VLB Opti 486DLC-40 w/ 128Kb + CPU	$138
VLB & PCI P5-60, 66MHz w/ 256KB + FD + I/O	$218
Opti VLB & PCI P5-90, 100MHz w/ 256Kb	$288

Acer

VLB SIS-471 486 w/ 256Kb (AMI BIOS)	$95

FREE COMPUTER TECH.

VLB SIS-471 486 w/ 256Kb (30 & 72-pin)	$95
VLB SIS-471 486 w/ 256Kb (72-pin)	$98
VLB SIS-471 486 w/ 256Kb (Support 100MHz)	$118
PCI 486 w/ 256Kb (Intel chipset)	$158
VLB & PCI P5-90, 100MHz w/ 256Kb	$288

AIR
Advanced Integration Research Inc

VLB SH-1 486 w/ 256Kb (30-pin)	$99
VLB SH-2 486 w/ 256Kb (72-pin)	$118
VLB MI-2 486 w/ 256Kb (72-pin) + IDE VLB IO	$178
VLB MIS 486 w/ 256Kb + IDE & SCSI + IO	$208
VLB & PCI VP 486 w/ 256Kb (30 & 72-pin)	$178

Genoa
SYSTEMS CORPORATION

VLB Turbo Express 486 w/ 256Kb (30-pin)	$108
PCI LB Turbo Express 486 w/ 256Kb (72-pin)	$168

IBM

VLB 486SLC2-66MHz w/ 64Kb + CPU + Math	$158
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P5-90MHz w/ 256Kb	$318

CPU'S

Cyrix

Cyrix 486DLC-40MHz	$58
Cyrix 486DX-33, 40, DX2-50MHz	$105 / $115 / $125

Advanced Micro Devices

AMD 486DX-40MHz	$168
AMD 486DX2-66MHz	$208
AMD 486DX2-80MHz	$298

intel.

Intel 486SX-25, 33MHz	$68 / $98
Intel 486DX-33MHz	$123
Intel 486DX2-50MHz	$168
Intel 486DX-50MHz	$268
Intel 486DX2-66MHz	$228
Intel 486DX4-100MHz	$498

pentium
PROCESSOR

Intel P5-60MHz	$408
Intel P5-66MHz	$528
Intel P5-90MHz	$618

MEMORY

1 x 9 - 70ns (3 chips)	$36.95
4 x 9 - 70ns (9 chips)	$134.95
1 x 32 - 70ns (72-pin)	$145.95
1 x 36 - 70ns (72-pin)	$159.95
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2 x 36 - 70ns (72-pin)	$315.95
2 x 36 - 60ns (72-pin)	$325.95
4 x 32 - 70ns (72-pin)	$465.95
4 x 36 - 70ns (72-pin)	$525 95
4 x 36 - 60ns (72-pin)	$545 95

VIDEO CARDS

ISA, VLB & PCI BUS

Super VGA w/ 512Kb	$34
Windows Accelerator w/ 1Mb (CL-5420)	$54
Windows Accelerator VLB w/ 1Mb (Trident)	$62
Windows Accelerator VLB w/ 1Mb (CL-GD5428)	$62
Windows Accelerator VLB w/ 1Mb (S3-805)	$62
Windows Accelerator VLB w/ 2Mb (ET-32i)	$125
Windows Accelerator PCI w/ 1Mb (S3-864)	$98

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8500 VLB Turbo w/ 1Mb	$85
Phantom 32P PCI or VLB w/ 2Mb	$168

DIAMOND
Computer Systems, Inc.

SpeedStar Pro VLB w/ 1Mb (CL-5428)	$93
Stealth 24 VLB w/ 1Mb (S3-805)	$128
Stealth 32 VLB or PCI w/ 2Mb (Tseng W32P)	$158
Stealth 64 VLB or PCI w/ 1Mb (S3-864)	$138
Stealth 64 VLB or PCI w/ 2Mb (S3-864)	$178
Stealth 64 VLB or PCI w/ 2Mb (S3-964)	$278
Stealth 64 VLB or PCI w/ 4Mb (S3-964)	$398
Viper VLB w/ 2Mb (Weitek P9000)	$268
Viper PCI w/ 2Mb (Weitek P9000)	$248
Viper PCI w/ 2Mb ----> 4Mb (Weitek P9100)	$278
MultiMedia Kit (1000)	$358
MultiMedia Kit (5000)	$498

ORCHID

Kevin EZ VLB or PCI w/ 1Mb	$93
Celsius VLB w/ 1Mb or 2Mb (AGX015)	$98 / $168
Kelvin 64 VLB or PCI w/ 1Mb or 2Mb	$128 / $168

SPiDER
Graphics, Inc.

Spider 32+ VLB w/ 1Mb	$95
Spider 256 Cache VLB w/ 1Mb (128C)	$115
Spider 256 Cache VLB w/ 2Mb (256C)	$155
Spider Black Widow+ VLB / PCI w/ 2Mb	$225
Spider 64 VLB / PCI w/ 2Mb or 4Mb	$165 / $265
Spider Tarantula 64 VRAM VLB / PCI w/ 2Mb	$265
Spider Tarantula 64 VRAM VLB / PCI w/ 4Mb	$385

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Graphic Ultra Pro PCI w/ 2Mb (OEM)	$218
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Graphic Win Turbo PCI w/ 4Mb Vram (OEM)	$453
Graphic Pro Turbo PCI w/ 2Mb Vram (Retail)	$348
Graphic Pro Turbo PCI w/ 4Mb Vram (Retail)	$558

Hercules

Dynamite Stinggray VLB w/ 1Mb	$118
Dynamite Power VLB or PCI w/ 2Mb (ET- W32p)	$208
Dynamite Graphic Power VLB or PCI w/ 2Mb	$298

matrox

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MGA PCI / 2 Plus w/ 4Mb (Retail)	$518

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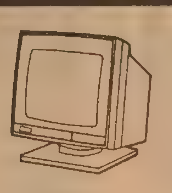
9GXE64 PCI w/ 2Mb (S3-864)	$228
9GXE64 PRO VLB / PCI w/ 2Mb (S3-964)	$355
9GXE64 PRO VLB / PCI w/ 4Mb (S3-964)	$525

MONITORS



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15" (1280 x 1024) .28 Non-interlaced	$288

Acer

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17" ACER 76I (1280 x 1024) .28 NI	$618

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15" ViewSonic 15EX	$353
15" ViewSonic 15G	$388
17" ViewSonic 17G	$758
20" ViewSonic 20	$1428
21" ViewSonic 21	$1608

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SAMPO

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SONY.

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17" GDM - 17SE1	$Call
20" GDM - 20SE1	$Call

NANAO

17" Nanao F550iw (1280 x 1024) .28 NI	$898

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IDE 2HD & 2FD 2s, 1p, 1g	$9.95
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IDE VLB 2HD & 2FD 2s, 1p, 1g	$16
VLB IDE 4HD & 4FD 2s (16,550 UART), 1p, 1g	$38
IDE PCI + AT I/o	$38
PCI SCSI-2 (NCR)	$75
PCI Fast & Wide SCSI (NCR 53C825)	$125
AT I/O 2s (16,550 UARTS), 1p, 1g	$25

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CORPORATION

2278 IDE VLB 4HD & 2FD 2s, 1p, 1g	$19.95
3270 SCSI VLB 7SCSI & 2FD	$108
2277 IDE VLB Caching (0-16Mb)	$108
3290 EISA SCSI (0-4Mb)	$168

adaptec

1542C w/o Kit or w/ Kit (OEM)	$158 / $198
2842 VL Fast SCSI-II VESA w/ Kit (Retail)	$228
2940 PCI SCSI-2 w/ kit (OEM)	$185
2940 PCI SCSI-2 w/ kit (Retail)	$265
2940W PCI SCSI-2 w/ kit (OEM)	$255

PROMISE
TECHNOLOGY,INC.

DC-420 IDE VLB w/ 512KB 2s, 1p, 1g	$88
DC-4030VL-2 IDE VLB (0--->16MB)	$98

BUSLOGIC

BT-445S SCSI-2 Vesa LB	$198
BT-946C Bus Master PCI SCSI-2	$238
BT-910A PCI IDE Caching Controller	$Call

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213MB IDE 14ms (WD-2120)	$158
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345MB IDE 14ms (7345A)	$168
540MB IDE 12ms (MXT-7540AV)	$228
540MB IDE 8.5ms (MXT-540A)	$248

CONNER

213MB IDE 14ms (CFS210A)	$153
420MB IDE 12ms (CFS420A)	$188
540MB IDE 12ms (CFA540A)	$258
540MB SCSI 12ms (CFA540S)	$Call

FUJITSU

1.0GB SCSI-II 10ms (M2694ESA)	$548

Quantum

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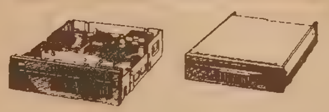
540MB SCSI 12ms	$278

MICROPOLIS

1.05GB SCSI-2 8.5ms (MC4110)	$548
1.75GB SCSI-2 10ms (MC2217)	$908
3.0GB SCSI-2 11ms (MC1936)	$Call

FLOPPY DRIVES



1.44Mb (Panasonic)	$30
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1.44Mb (TEAC)	$33
1.2Mb (TEAC)	$42
1.44Mb (TEAC) Black	$38
1.2Mb (TEAC) Black	$48
1.2MB & 1.44MB Combo (EPSON)	$83
1.2MB & 1.44MB Combo (TEAC)	$95

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Mitsumi Double Speed 250ms w/o controller	$118
Mitsumi Double Speed 250ms (IDE Type)	$125
Panasonic Double Speed 310ms (CR-562)	$118
Toshiba Double Speed SCSI 200ms (XM-3401B)	$238
Toshiba Quad Speed SCSI-2 (XM-3501B)	$368
NEC Triple Speed SCSI 190ms (510)	$278
NEC Triple Speed SCSI 3XI w/ controller	$478

KEYBOARDS

Mitsumi 101 Enhanced Keys	$15
Qtronic 101 Enhanced Keys (Black)	$18
Keytronic 101 Enhanced Keys	$25
NMB 101 Enhanced Keys Click	$45
Focus 2001 101 Enhanced Keys	$32
Focus P9000 Click w/ Calculator	$48

MODEMS

Modem & FAX 14.4 (Internal)	$58

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GVC Modem & Fax 14.4 (Internal)	$68
GVC Modem & Fax 28.8 (Internal)	$158

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MICE

3-Buttons Serial	$4.95
TrackBall Serial	$16 95
Pen Mouse	$19.95

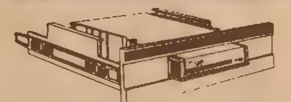
LOGITECH

Logitech 2 Buttons Serial	$14 95
Logitech MouseMan Bus	$44 95
Logitech Portable Serial	$44.95
Logitech Dexxa Serial	$16.95
Logitech First Serial	$25.95
Logitech MouseMan Serial	$35.95
Logitech First TrackBall Serial	$44.95
Logitech TrackMan Serial	$74.95
Logitech TrackMan Voyager Serial	$64.95
Logitech CyberMan 3D Controller	$69.95

Microsoft

Microsoft Serial Mouse (Ergonomic)	$24.95
Microsoft Bus Mouse (Ergonomic)	$59 95

ACCESSORIES



Colorado 250Mb Tape Back-up (Retail Box)	$148
Colorado 350Mb Tape Back-up (Retail Box)	$168
Toner HP-92274A	$68
Toner HP-92298A (4-plus)	$118
Toner HP-C43900A (4-V)	$158
HP-51640 Series (Magenta, Cyan, Yellow, Black)	$24.95
CPU Cooling kit w/ heatsink & fan	$4.98
CPU Cooling Kit w/ heatsink & fan (Pentium)	$9.98
Speakers 80 Watts	$45
MS-DOS 6.22 (OEM) w/ system only	$35
MS-DOS Windows 3.11 (OEM) w/ system only	$45
MS-DOS Windows 3.11 for WorkGroup (OEM)	$55

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Sound Blaster 16 MCD (Retail Box)	$128
Sound Blaster 16 MCD w/ ASP (Retail Box)	$163
Sound Blaster 16 SCSI-II (Retail Box)	$148
Sound Blaster 16 SCSI-II w/ ASP (Retail Box)	$193
Sound Blaster AWE 32 Value (Retail Box)	$238
Discovery 16 CD (Retail Package)	$238
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Mini tower + 230 watts P.S	$33
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Multi Media Desk Top Case + 250 watts P.S	$118
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Resources

Calendar Of Events

NOVEMBER 20

CHILDREN'S EDUCATION SOFTWARE FAIR

JEWISH COMMUNITY CENTER, PALO ALTO

Produced by the Mid-Peninsula Jewish Community Day School, the Children's Educational Software Fair is for parents, kids, and families interested in learning more about new educational software products in a fun and user-friendly environment. The Fair will include exhibits and hands-on demonstrations by leading software vendors, workshops on kids' computing products by several experts in the field, raffles, and refreshments. Software and related products will be available for purchase on-site. The Fair takes place from 10 am to 5 pm at the Rollnick Auditorium of the Albert J. Schultz Jewish Community Center in Palo Alto, and admission is $5 for adults with discounts for families. For more information contact David Waxsberg at (415)493-5942.

DECEMBER 4 & 11

COMPUTER SHOW AND SALE EXPO

Bonanza Show Productions is expanding its Computer Show and Sale expos from Southern California to Northern California. The debut shows will be at the Santa Clara County Fairgrounds in San Jose on December 4, and the Alameda County Fairgrounds in Pleasanton on December 11. There will be millions of dollars of state-of-the-art computer merchandise under one roof, including CD-ROMs, software, hardware, memory chips, peripherals, and more. Admission is $5, and all display ads have a $2 coupon. Children 12 and under are free. For more information call Joe at (415)595-1053.

NOTICE

Because of the plethora of listings received and the limited space available, we are not able to list every class offered by every educator. We try to give a representative sample when we can't fit all of a company's offerings, but please call the organizations for complete information on their classes or to receive a course catalog.

Conferences, Shows, Special Events

November

November 16 Internet Roundtable Society Internet Relay Chat: Interview With NPR's Susan Stamberg. Internet Roundtable Society. Call: (415)327-4386 or IRinfo@fununiv.com .

November 20 Children's Educational Software Fair. Palo Alto. Call: David Waxsberg, (415)493-5942.

November 20 Computer Products Show And Sale. Civic Auditorium, Stockton. MarketPro. Call: (415)456-6730.

November 26 Computer Products Show And Sale. Solano County Fairgrounds, Vallejo. MarketPro. Call: (415)456-6730.

November 27 Computer Products Show And Sale. Scottish Rite Center, Sacramento. MarketPro. Call: (415)456-6730.

December

December 2 Joe's Digital Diner: Convivial Design. San Francisco. San Francisco Digital Media Center and D3TV. Call: (415)824-9394.

December 2–4 Electronic Learning Fair. San Jose. *San Jose Mercury News.* Call: Nancy Woodard, (408)920-5850.

December 3 Computer Products Show And Sale. Sonoma County Fairgrounds, Santa Rosa. MarketPro. Call: (415)456-6730.

December 4 Computer, Ham Radio, Electronics Swap Meet. Las Positas College, Livermore. Livermore Amateur Radio Club. Call: (510)783-2803 days, 447-3857 eves.

December 4 Computer Show And Sale Expo. Santa Clara County Fairgrounds, San Jose. Bonanza Show Productions. Call: Joe, (415)595-1053.

December 5 The Real World Of Corporate Information Politics Presentation. San Jose. Computer Literacy Bookshops. Call: (408)435-1118.

December 5–6 The Personal Computer Outlook Conference. San Francisco. Technologic Partners. Call: (212)696-9330.

December 5–7 IT Services '94 Conference And Expo. Santa Clara. Creative Expos & Conferences. Call: (508)429-2303.

December 5–9 Video Expo/Image World West Conference And Expo. San Jose. Knowledge Industry Publications, Inc. Call: 1-800-800-5474.

December 7 Internet Roundtable Society Internet Relay Chat: Interview With Howard Rheingold. Internet Roundtable Society. Call: (415)327-4386 or IRinfo@fununiv.com .

December 10–11 Computer Products Show And Sale. Cal Expo, Sacramento. MarketPro. Call: (415)456-6730.

December 11 Computer Show And Sale Expo. Alameda County Fairgrounds, Pleasanton. Bonanza Show Productions. Call: Joe, (415)595-1053.

December 12–16 ProjectWorld Conference And Expo. Santa Clara. Center for Management Research. Call: Don Dible, (408)730-6830.

December 17 Computer Marketplace. San Mateo Expo Center. National Productions. Call: (408)778-5200 or 1-800-800-5600.

December 17–18 Computer Products Show And Sale. Solano County Fairgrounds, Vallejo. MarketPro. Call: (415)456-6730.

January 1995

January 1 Computer, Ham Radio, Electronics Swap Meet. Las Positas College, Livermore. Livermore Amateur Radio Club. Call: (510)783-2803 days, 447-3857 eves.

January 4–7 MACWORLD Expo. San Francisco. IDG World Expo. Call: Mitch Hall & Assoc., (617)361-2001.

January 7–8 Computer Products Show And Sale. Cal Expo, Sacramento. MarketPro.

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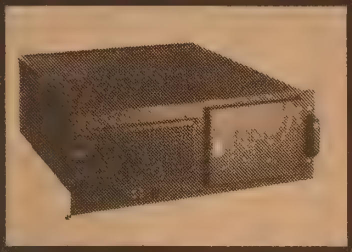

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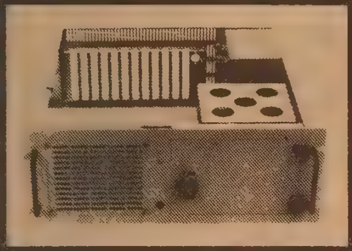

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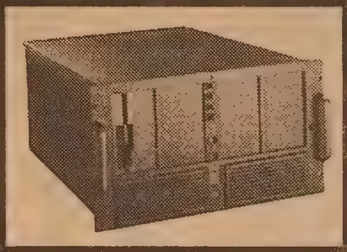

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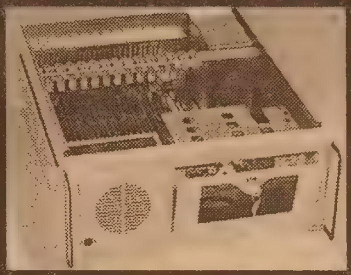

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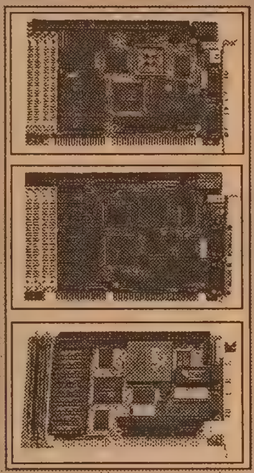

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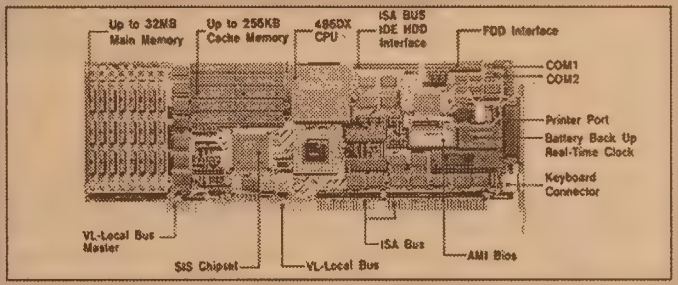

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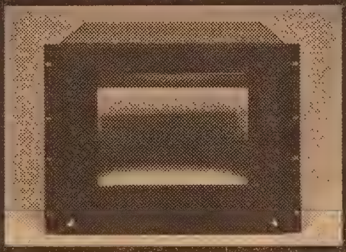

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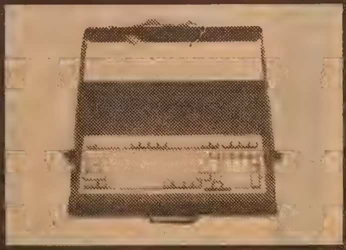

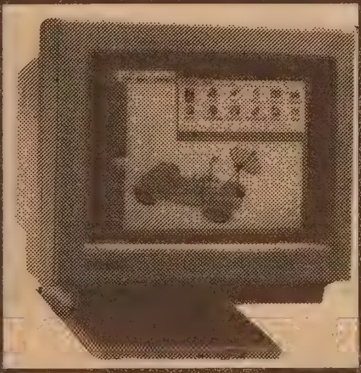

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January 11–12 PDA Industry Forum. San Jose. Apple, Sharp, Casio, Motorola, IBM. Call: Nola Armijo, (415)821-0191.

January 15 Computer Products Show And Sale. Sonoma County Fairgrounds, Santa Rosa. MarketPro. Call: (415)456-6730.

January 17–19 SoftExpo95 Conference And Exhibit. San Jose. *Software Publisher* magazine. Call: ExpoMasters, (303)771-2000.

January 19–22 Medicine Meets Virtual Reality III Conference. San Diego. UCSD School of Medicine. Call: (619)751-8841.

January 21–22 Computer Products Show And Sale. Solano County Fairgrounds, Vallejo. MarketPro. Call: (415)456-6730.

January 31–February 2 Display Manufacturing Technology Conference. Santa Clara. Society for Information Display. Call: Mark Goldfarb, 1-800-787-7477.

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February 5 Computer, Ham Radio, Electronics Swap Meet. Las Positas College, Livermore. Livermore Amateur Radio Club. Call: (510)783-2803 days, 447-3857 eves.

February 13–17 Software Development '95 West Conference. San Francisco. Software Development Conference and Show Group. Call: (415)905-2784.

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November

November 16–17 Delivering Email: Successful Enterprise Implementation Strategies Seminar. San Francisco. DCI. Call: (508)470-3880.

November 16–17 Mechanical Solids Modeling And Rendering With AME Workshop. Santa Clara. The Copper Connection. Call: (408)970-9838.

November 17 ACCPAC Plus Training Class For Beginners. San Francisco. Lindquist & Lukrich Consulting. Call: (415)905-6900.

November 18 PowerPoint For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

November 18–20 Home Movies Intensive Workshop. San Francisco. San Francisco Digital Media Center. Call: (415)824-9394.

November 18–20 Intro To Media Composer Class. San Francisco. Bay Area Video Coalition. Call: (415)861-3282.

November 19 Beginning Digital Editing With QuickTime Class. San Francisco. Bay Area Video Coalition. Call: (415)861-3282.

November 20 Intro To The WELL Class. Corte Madera. The WELL. Call: Sharon Vaugn, (415)332-4335.

November 21 Complete Online Novell CNE Training. Berkeley. Cyber State University. Call: (510)253-TREK.

November 21 Word 6.0 For Windows Intermediate Class. San Rafael. Clear Communication. Call: 1-800-783-7531.

November 21 WordPerfect For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

November 21–22 Advanced PC Troubleshooting Seminar. Sacramento. Essential Seminars, Inc. Call: 1-800-723-7025.

November 22 Advanced Photoshop For Mac Class. San Francisco. Ciber Training Services. Call: (415)281-6100.

November 22 Gary Wolf And Michael Stein: Aether Madness Presentation. San Francisco. Liberty Hill Cyberwerks and Modern Times Bookstore. Call: (415)282-9246.

November 22–23 Network Fundamentals Hands-On Class. Oakland. Excel Micro Solutions. Call: (510)836-2040.

November 23 Excel 4.0/5.0 For Windows Beginning Class. San Rafael. Clear Communication. Call: 1-800-783-7531.

November 25 Using Windows 3.1 Beginning Class. San Rafael. Clear Communication. Call: 1-800-783-7531.

November 26 How To Build Your Own Windows For Workgroups Computer Network And Save $ Class. El Cerrito. Network Magicians. Call: (510)528-9895.

November 28 Complete Online Novell CNA Training. Berkeley. Cyber State University. Call: (510)253-TREK.

November 28 IBM PC Clone Hands-On Hardware Class. Oakland. Excel Micro Solutions. Call: (510)836-2040.

November 28 Macintosh Network Administration Class. San Francisco. Ciber Training Services. Call: (415)281-6100.

November 28–29 Understanding Document Imaging Seminar. Sacramento. Data-Tech Institute. Call: (201)478-5400.

November 29 Quattro Pro 5.0 For DOS/Windows Level 2 Class. Emeryville. Northwest Computer Systems. Call: Cathy Day, (510)653-0808 ext. 209.

November 29–30 Advanced Troubleshooting For The Macintosh Seminar. Sacramento. Data-Tech Institute. Call: (201)478-5400.

November 29–December 1 Designing And Developing Data Warehouses Seminar. San Francisco. DCI. Call: (508)470-3880.

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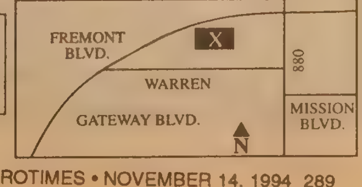

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December 1–2 Getting Started With Windows NT Seminar. San Francisco. Center for Advanced Professional Development. Call: (714)261-0240.

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December 2 Intro To Computers Class. Oakland. PCLink. Call: (510)562-5511.

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December 3 CNE Hands-On Study Group. Oakland. Excel Micro Solutions. Call: (510)836-2040.

December 3 The Internet: What Is It? Class. UC Berkeley campus. UC Berkeley Extension. Call: (510)643-6904.

December 4 Internet 101: In-Depth Overview For Beginners Class. San Francisco. Internet Literacy Consultants. Call: (415)469-8271.

December 5 Lotus 1-2-3 For Windows 4.0 Level 1 Class. Emeryville. Northwest Computer Systems. Call: Cathy Day, (510)653-0808 ext. 209.

December 5–6 Novell System Supervisor 3.12 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808 ext. 209.

December 5–6 PC Memory Management Seminar. San Francisco. Data-Tech Institute. Call: (201)478-5400.

December 5–8 Intermediate ScriptX Seminar. Santa Clara. Kaleida Labs, Inc. Call: (415)966-0400.

December 6 The $79 Network Solution Seminar. San Francisco. Network Services Group. Call: (415)863-8407.

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December 6 & 8 WordPerfect Part 1 Class. Oakland. PCLink. Call: (510)562-5511.

December 7 Automating The Testing Of GUI Client/Server Applications In A RAD Environment Free Seminar. San Jose. SQA, Inc. Call: Registration, 1-800-228-9922.

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December 12–13 Advanced PC Troubleshooting Seminar. San Francisco. Essential Seminars, Inc. Call: 1-800-723-7025.

December 12–13 Basic Telecommunications For Business Seminar. San Francisco. Center for Advanced Professional Development. Call: (714)261-0240.

December 12–13 Project 4.0 Level 1 & 2 Class. Emeryville. Northwest Computer Systems. Call: Cathy Day, (510)653-0808 ext. 209.

December 12–13 Supporting And Troubleshooting Windows 3.1 Seminar. San Jose. Data-Tech Institute. Call: (201)478-5400.

December 12–15 Introducing ScriptX Seminar. Santa Clara. Kaleida Labs, Inc. Call: (415)966-0400.

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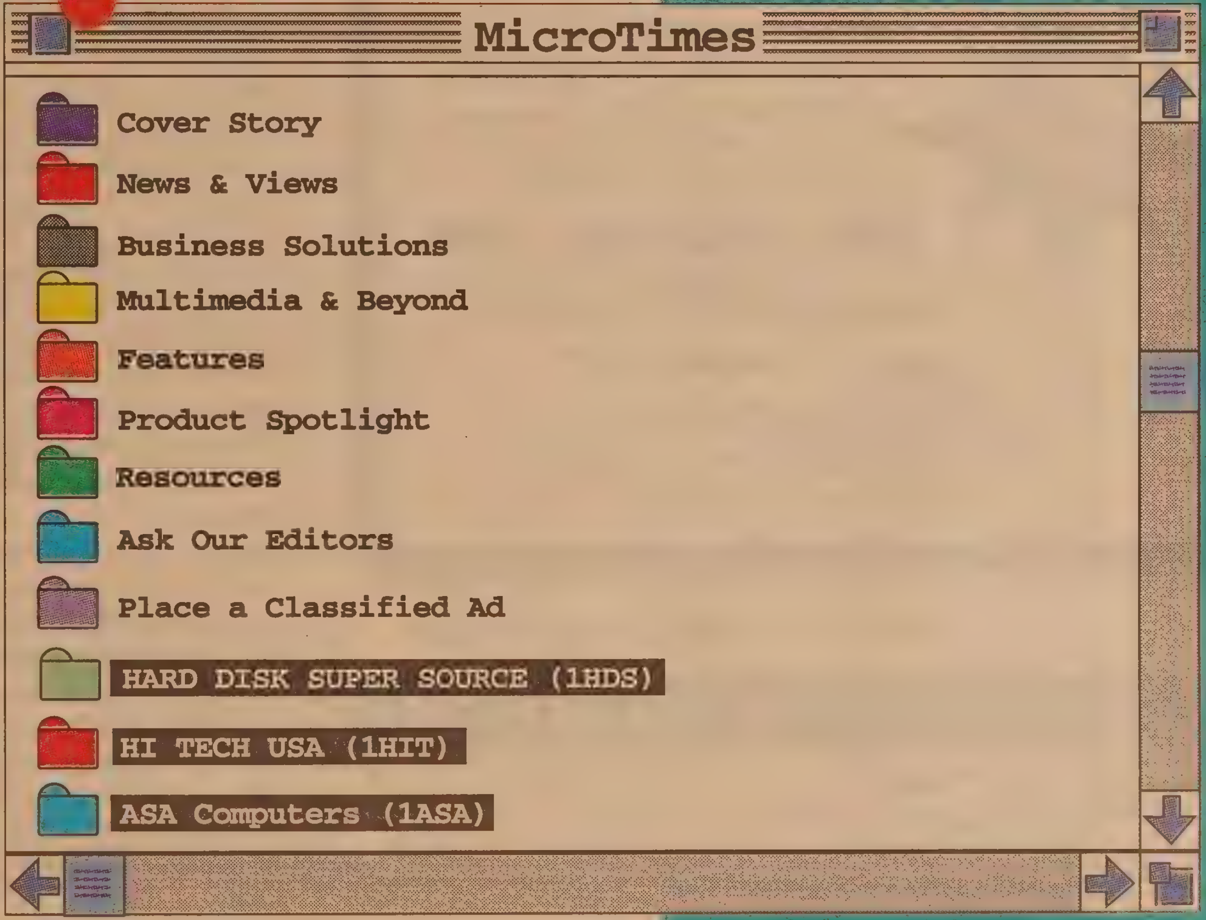

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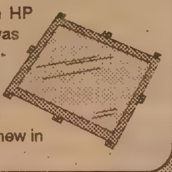


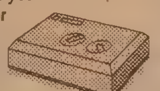
Actually, it's the display screen from an HP laptop (we don't know which one yet). It was made by Epson, it has the Epson part number of ECM-A0234, it measures 7" x 9.25" in display area, with a .75" border, it has a 16 pin header on .1" centers, and it can be yours for only $24.95! These are factory new in antistatic bags. HSC# 15016 $24.95

Bargain Ethernet Card

The Ansel Communications NS2104-TB will get you connected! 16-bit ISA bus card works with most leading LAN operating systems such as NetWare and LAN Manager. This particular model is a 4-port hub, with 16-bit Busmaster Software-Selectable Ethernet Adapter for either 10 BASE-2 or 10 BASE-T. These are new-in-the-box units, ready for plug & play, just run your cabling and install the software for configuration. Hurry, limited supply!

HSC# 15012 **$39.95**

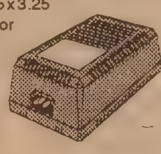
Give your Mac Vision!



With MacVision (and a video camera) your Macintosh will be able to see the outside world! Capture video stills from any composite video source (camera, VCR, video disk) and you can commit a B & W image to a disk file for editing with your paint program. New in the box unit with cables and power supply. Works with Mac II, SE or Plus, System 4.1+

HSC# 80150 **$39.95**

NeatBitz...



A. Handy Power Supply #1 -- Beautiful little switching power supply rated at 5VDC, 3A measures 2.75 x 3.25 x 5.25", has standard IEC receptacle for universal (100 - 250VAC, 47 - 63 Hz) input. IEC cord not included, see "C" below. Output is through 6' cord with DIN plug that may be cut off for your own plug to be installed. New in box. HSC#14996 $5.95

B. Less-Handy Power Supply #2 -- similar in appearance to "A" above, this is a linear supply rated at 12VDC @ 1200 mA, but the input is strapped for 240 VAC input. Use as is with 110VAC for lower voltage output, or open it up and re-strap it for 110VAC use. (Or inquire about our stock of foreign IEC cords to use as is with 240 VAC!) Measures 2.5 x 4 x 6.5", and will need a standard IEC cord ("C" below). HSC#14980 $5.95

C. Standard IEC Power Cord -- many uses, including powersupplies "A" & "B" above or drive case at left. HSC#80119 $.99

D. Network Installation Special -- Dual Terminal Kit. Contains two high-quality ten-foot RG-58 coax cables with BNC's, two BNC tee's, two BNC 50Ω terminators, one BNC coupler. Enough to cable two Thin-net stations to the wall-plate! HSC# 14967 $9.95

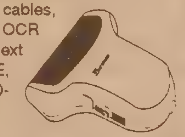
E. VGA to RGB Cable -- Ten foot cable has high-density 15-pin D-sub (VGA type) connector on one end, and 5 BNC connectors on the other: Red, Green, Blue, Horizontal and Vertical synch. Perfect for those high-res CAD monitors! HSC# 14963 $14.95

F. "Doorknob" Capacitors -- 440pF @ 40KV, made by Murata. HSC# 15021 $6.95 Some other values available, inquire.

Scanners for Macintosh!

Don't re-type that document into your Mac...don't paint the Mona Lisa with your mouse...just "Scan it!" with these handy scanners!

A. 256 Gray Scale Hand Scanner -- SCSI interface, 100 to 400 dpi, eight-bit (256 shades of gray), 4.134 inch scan path. Image enhancement software with customizable tool & filters palette, edge detection, etc. New in box with adaptors, cables, manual & software. Requires Mac SE/30 or II family, 8-bit video card, 2 MB RAM. 90-day warranty. HSC# 14808 $79.95

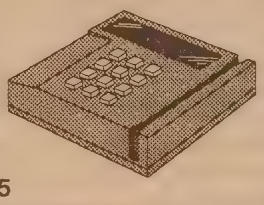


B. "Speed Reader" B&W Hand Scanner -- SCSI interface, 100 to 400 dpi, dithered or Black & White modes, 4.134 inch scan path. Handy for scanning halftones. line-art, etc. "MacSee" software is a simple B&W paint program for editing your images. New in box with adaptors, cables, manual & software. Use with your own OCR software (sorry, we don't have any) for text recognition. Requires Mac Classic, SE, LC, SE/30 or II family, 1 MB RAM. 90-day warranty. HSC# 14809 $49.95

Listen to your Computer!

...with these external speakers by Labtec. Perfect for use with any sound card or personal stereo system, they feature magnetically shielded enclosures, "enhanced bass-response cabinet design", 40 - 16000 Hz freq. response, 3" speakers, 4 watt amplifiers (when 2 C-cells per side are installed) and attractive beige styling. Model CS-550 has bass-boost and treble-boost switches, volume control. These were factory returns, should be OK. HSC#14977 $9.95

Satisfy your Curiosity!



You've seen them everywhere... department stores, grocery stores, even at HSC! If you haven't wondered what was inside of these little credit card verification terminals, then you are not the normally inquisitive techno-junkie who reads these ads! If your curiosity *is* piqued, however, then this is your chance to resolve your questions. These used VeriFone Tranz 240 transaction terminals have a vacuum-fluorescent alphanumeric 16-character readout, 12-key keypad, Z-80 processor, CMOS program EPROM, and mag-stripe read-head. Some may have had the mag-stripe read head disconnected, as these were used strictly for keyboard entry, but it should be possible to reconnect it. They were made to communicate with a host computer over a RS-485 line, and use a 8.5 VAC adaptor (sorry, we don't have any of those yet). Quantity discounts available if you are *really* curious!

HSC# 14848 **$19.95**

RF/Microwave Goodies for the High (Frequency) Minded...

We recently received a nice selection of Hewlett Packard RF/ Microwave devices for all you high-freq. freaks! The following list is only a partial listing of the thirty or so numbers we have available. We have spec. sheets for all items below, we are attempting to get info on the rest of the parts we have available. Note: The TXV suffix on some of these parts means extra-high reliability (i.e. military/NASA grade), each unit was visually inspected under a microscope before being hermetically sealed.

Cascadable Silicon Bipolar MMIC Amplifiers

Part Num.	*Equiv.*	*Gain*	*Power*	*V_d*	*Bandwidth*	*Price*
HPMA 0470TXV	MSA 0470	8.5dB/1GHz	12.5dBm/1GHz	5.75 max	3dB:DC to 4GHz	$8.95

Low-noise NPN Silicon Transistors

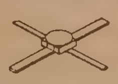
Part Num.	*Equiv.*	*Gain*	*Power*	*V_{CBO}*	*I_c (mA)*	*Noise Fig.*	*Price*
HXTR 3103TXV	2N6838	15dB/1GHz	21dBm/1GHz	30 max	70 max	1.8dB/1GHz	$5.95
HXTR 6101TXV	2N6617	13.5dB/2GHz 9.0dB/4GHz		35 max	20 max	1.6dB/2GHz 2.8dB/4GHz	$6.95
HXTR 6103TXV	2N6618	12dB/2GHz		30 max	20 max	1.8dB/2GHz	$5.95
HXTR 6104TXV	2N6743	14dB/1.5GHz		30 max	20 max	1.4dB/2GHz	$7.95
QXTR 3968	AT41435	14dB/2GHz 10dB/4GHz	19dBm/2GHz 18.5dBm/4GHz			1.7dB/2GHz 3.0dB/4GHz	$7.95

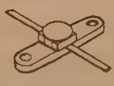
High-gain NPN Silicon Transistors

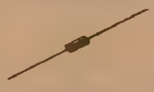
Part Num.	*Equiv.*	*Gain*	*Power*	*V_{CBO}*	*I_c (mA)*	*Price*
HXTR 5101TXV	2N6701	13dB/2GHz 7.5dB/4GHz	23dBm/2GHz 22dBm/4GHz	45 max	100 max	$7.95
HXTR 5102TXV		11.5dB/2GHz	29dBm/2GHz	45 max	250 max	$9.95
HXTR 5103TXV	2N6741	11dB/2GHz 7dB/4GHz	23dBm/2GHz 22dBm/4GHz	45 max	100 max	$6.95

PIN Diodes

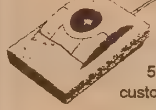
Part Num.	*Power Diss.*	*Residual Resistance*	*Recovery Time*	*Cap.*	*Comments*	*Price*
5082-3001TXV	250mW	1Ω	100nS	.25pF	Gen. Purpose	$2.95
5082-3168TXV	250mW	.5Ω/100v	12nS	2pf/20V	Band Switching	$3.95



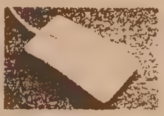




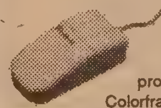
Pointing Devices Aplenty!



A. Mouse Systems Trackball -- A cluttered desktop need not prevent you from using a decent pointing device for your Windows wandering...use a trackball! No clear space needed for rolling around, it just sits there while your fingertips direct your cursor. 100% Microsoft compatible, uses only 4" x 5.5" of desk space and a serial port. New in box with drivers and software to create custom drop down menus for your "non-mouse-able" programs. HSC# 15009 $27.50



C. High-Quality Optical Mouse (shown at right) -- serial interface (9-pin "D-sub") two-button mouse by Mouse Systems, comes with 7" x 7.75" mousepad. No mechanical parts to wear out or get dirty...no balls to clean! New, with driver disk, OEM version (no book or box). HSC# 14719 $14.95



D. MacPRO mouse -- three-button Mac compatible mouse by Animas (shown at left). 350 DPI resolution, Apple ADB interface (4-pin Mini-DIN) for Mac II, IIc, IIci, IIfx, IIsi, LC, SE, Classic, or other Macintosh computer with ADB port. Programmable "cdev" allows full programmability for all three buttons. You even get a paint program called Colorframe (included on driver disk). New in box with manual, mouse-mat, 90 day warranty. HSC# 14718 $19.95

Network Card Closeout!

We have a limited supply of the following Ansel Communications network cards:

NH2000B 16-bit Ethernet, 10-Base 2 Coax, NE2000 Compatible, $29.95
NH2000T 16-bit Ethernet, 10-Base T twisted pair, NE2000 Compatible, $29.95
NH2000TA 16-bit Ethernet, 10-Base T twist pair, AUI, NE2000 Compat., $29.95
NH2000BA 16-bit Ethernet, 10-Base 2 Coax, AUI, NE2000 Compatible, $29.95
NS2000TA 16-bit Ethernet, 10-Base T twist pair, AUI, NE2000 Compat, $29.95
NS2104TB 16-bit Ethernet, 10-Base 2 Coax, 10-Base T 4-port hub, $39.95
NS3200 32-bit EISA Ethernet 10-Base 2, 10-Base T, 10-Base 5, AUI $39.95

Also from Ansel: Model 7200 EISA Fast SCSI Host Adaptor, 32-bit Busmaster SCSI-2, Fast SCSI-2 Support, $49.95

Also, not from Ansel: 3Com NW1000TP 8-bit 10-Base T card, $29.95

All of the above are boxed, with software and manuals. Hurry, supplies limited!

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- Orchid Kelvin 64-bit VLB w/1MB
- 14" SVGA .28 NI Monitor
- 101 Enhanced Keyboard
- Minitower w/230Watt P.S.
- Microsoft-compatible Serial Mouse

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486DX2-50MHz	$1009
486DX2-66MHz	$1059
486DX2-80MHz	$1139

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- 101 Enhanced Keyboard
- Minitower Case w/230Watt P.S.
- Microsoft-compatible Serial Mouse

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- 4 MB RAM Exp. to 64 MB
- 1.44 Meg 3-1/2" Floppy Drive
- 540 MB IDE Cache Hard Drive 12ms
- 2 Serial, 1 Parallel & 1 Game Port
- 32-bit VLB Super IDE Controller
- Orchid Kelvin 64-bit PCI w/1MB
- 14" SVGA .28 NI Monitor
- 101 Enhanced Keyboard
- Minitower w/230Watt P.S.
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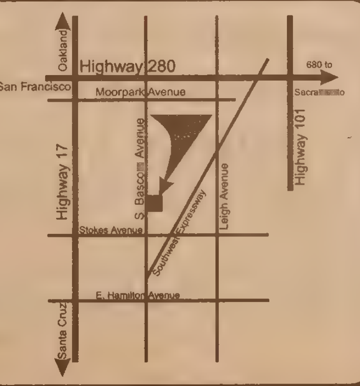

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Bay Area BBSes

By Kathleen Creighton

The State Of The BBS, Revisited

A couple of months ago in this column I mused aloud about the state of BBSing in the Bay Area. We're in a situation unique in the US because most of us, even those of us who live outside the "central" Bay Area, have low-cost, easy access to a variety of Internet providers. (It does give one pause to be logged in via the Net to some far-flung location while listening to geese and chickens squawk outside one's front door.)

The BBS Is Dead/Long Live The BBS

I asked for feedback from BBS sysops and users and I actually got some, which ranged from "the BBS era is dead" to "the Internet confuses me." From last year to this year, there has been a slight drop in the number of BBS listings in *MicroTimes*, but the drop is not significant enough to declare BBSing dead.

Frank Arnold, sysop of the Support Network BBS in San Jose, the only ADAnet (BBS) network provider in area code 408, says that he's seen only a slight drop-off in the number of callers to his BBS, which he describes as having the largest selection of files and information for disabled users in the state.

But this isn't a surprise. Because of the specific population it has served, highly trafficked Usenet medical support groups tend toward the specific chronic, shared, medical problems of employed and/or university-connected adults, notably AIDS, chronic fatigue syndrome, and multiple sclerosis. There are also a few heavily subscribed disability mailing lists, like one for the deaf. Groups formed as umbrellas for the many manifestations of arthritis, for example, don't do as well, partly because of the demographics of the Net and partly because arthritis is not one specific disease but several. It's difficult to discuss treatment for a creaky joint when surrounded by others who are wheelchair-bound by crippling juvenile rheumatoid arthritis.

And although there are small pockets of information for the disabled on the Net, there is not at this time any highly organized, sort of one-stop library for information. In fact, Arnold went on to say that the University of Alabama is working on an Internet gateway for ADAnet, which speaks to the value of this BBS network.

We're back to looking at the utility of special interest group BBSing. It does seem possible that quality BBSes will be able to retain a following despite the migration to the Net.

Score One More For The Local BBS

Reader Roger Barker brought up something I hadn't considered. "Without making a scientific study, it seems to me that messages between participants [on Usenet] are more antagonistic and less respectful of others than they are on BBS nets such as ILINK, RIME, Smartnet, etc."

I think there's some truth to this. People consistently complain about the nature of communications on Usenet, although not all Usenet newsgroups have an antagonistic tone. On the other hand, there does seem to be more moderation on the BBS echo message areas (although certainly not all are moderated, or moderated well). It has been speculated that more moderation will eventually come to Usenet, especially as the tendency to post anything one wants (such as advertising) in any newsgroup increases.

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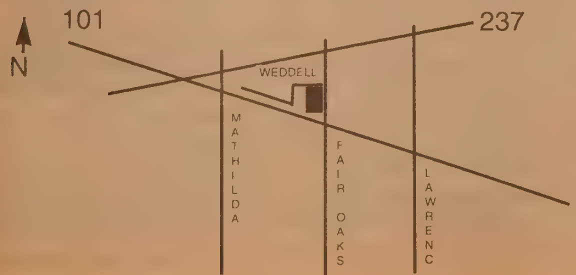

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510

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BBS Spotlight cont.

BBS networks can be as useful as, and sometimes more useful than, Usenet or the commercial services for the sharing of information. And fast friendships can and do form in echo message areas, as they do everywhere else.

BBSing is still alive and well in the Bay Area, although I probably wouldn't invest a lot of money in bringing a new one online right now unless I could also afford to put it directly on the Internet. And hopefully in a couple of years, as the software improves and Net links come down in price, we'll see lots of Bay Area BBSes in the global village. It will be interesting to take a look at this again a year from now to see where people are spending their online time.

Send Me Email!

Let me know what's going on around the Bay Area, great places to check out, praises, complaints, etc. I enjoy hearing from you. My email address is: casey@well.sf.ca.us . ■

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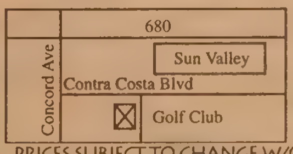

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Highway Access BBS. (510)865-6400, 865-6401. 8-N-1, 24 hrs., 14,400. 3.0GB of OS/2, DOS, and Windows shareware. FidoNet, Internet soon. Free. Sysop: Paul Benn. [Exp. #129.]

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K 3's Over The Wire Resumes. (Closed BBS) 90-day free resume listing. Call: (voice) (510)370-7006. [Exp. #130.]

Kitchen Table BBS. (510)547-7747. 24 hrs., 300–9600. FiberNet, QWK-paks. Food, gardens, music, parenting, laptops, prosperity. Woman sysop. Free. [Exp. #130.]

Knights Of The Silicon Table. (510)568-6556. Medieval-style BBS catering to game players and posting. DARKNet, BRENet. Sysop: Darius Mihaud. [Exp. #130.]

KRIJAQ BBS. (510)673-0103. 8-N-1, 24 hrs., 14,400. 100% free, download 60 mins. every call. CD-ROM disk catalogs. Sysop: John Dulaney. [Exp. #130.]

Last Chance BBS. (510)796-1378. 14,400. Message bases, Fnet, X-fers, online games. Free. Sysop: Poky. [Exp. #131.]

The Lost Worlds BBS. (510)888-1714. 24 hrs., 14,400. 10GB, 6GB adult; easiest to use interface, he who comes rarely leaves... [Exp. #131.]

Metropolis. (510)231-0353. 2400–28,800. Rime, Internet email, Usenet newsgroups, FidoNet, WCLawnet; Apogee/Software Creations distribution; more. Free trial. Sysop: Michael Chen. [Exp. #130.]

The Mission BBS. (510)353-9201. 24 hrs., 14,400. Home of creator of the Amiga: the late Jay Minor. Sysop: Gary Chow. [Exp. #129.]

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The Reflection Nebula. (510)253-9311. 28,800. Two lines. A superior Macintosh BBS, 1.2GB HD, USR modems. [Exp. #129.]

Silicon Knights BBS. (510)676-7640. 24 hrs., 14,400. FidoNet, Usenet, Internet email; support for Novell professionals. Free access/donations. Sysop: Steve Gleisner, Ed Donegan CNE. [Exp. #131.]

Starbase 13 BBS. (510)278-3926. 24 hrs., 14,400. FidoNet and many other nets, 1+GB of files, friendly sysop. Sysop: Bootmacker. [Exp. #129.]

VA Listings. (510)637-1261. 24 hrs., 300–9600. Multiline. VA-owned homes for sale. Sysop: David Piersall. [Exp. #130.]

Viper 1 Premium BBS. (510)535-0315, 535-0231. 8-N-1, 2400–28,800. 10 lines. Four Internet nodes, 11GB, large adult file areas, more coming. [Exp. #131.]

The VisualAge BBS. (510)685-9585. 8-N-1, 14,400. Two lines. General interest, echomail and Internet email soon, many files for download. Sysop: David R. Afana. [Exp. #129.]

Windows Online. (510)736-8343. Largest Windows BBS. Members receive free Internet, 30,000 Win 3.x files. Free trial. [Exp. #130.]

Winner's Circle. (510)845-4812. 24 hrs., 14,400. Supporting the Amiga in Berkeley. Free. [Exp. #129.]

Wishing Well BBS. (510)745-7901. 1200/ 14,400. Online games, quality files, ANSI art, RIP graphics, matchmaker, adult files. Sysop: MaryLou White [Exp. #131.]

X-Philia BBS. (510)251-9413. 8-N-1, 14,400. X Files stories, GIFs, JPGs related to the TV show; Vetlink. No fee. Sysop: Jon Mankowski. [Exp. #130.]

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ZEPHYR: The CyberBreeze Of Dreams. (707)421-8353. 8-N-1, 24 hrs., 2400–14,400. Dozens of games, thousands of files, Internet. Free/paid memberships. [Exp. #131.]

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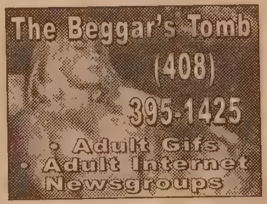
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USER GROUPS

AMIGA

AGA. Meetings: 7th of each month, 7:00 pm, downtown SF. Graphics users group for all Amiga users of 2-D, 3-D, animation, multimedia, and video software. Call: Ollie, (415)863-8792. [Exp. #130.]

AUM—Amiga Users Of Marin. Meetings: 3rd Wed., 7:00 pm, College of Marin Science Center, Rm. 192, Kentfield. Desktop video, Amiga applications. Call: (415)479-6717. BBS: (415)459-6621. [Exp. #133.]

AWEST—Amiga Users In SF. Meetings: 2nd Wed., 6:30 pm, Excelsior Branch Public Library, 4400 Mission St. (near Ocean), San Francisco. Call: (415)584-8406. BBS: (415)441-5145. [Exp. #133.]

FAUG—First Amiga User's Group. Meetings: 1st Tues., 7:30 pm, HT Electronics, 275 N. Mathilda Ave., Sunnyvale. Q&A, new product demos, public domain software. Call: Mike Fischer, (415)855-9816, BBS (415)341-7566. [Exp. #129.]

RE-Amiga—Redwood Empire Amiga User Group. Meetings: 2nd Tues., 7:30 pm. Call: (707)523-9978. BBS: (707)539-6944. [Exp. #133.]

TOGA—The Other Group Of Amigoids. Meetings: Varying Sat., 12:30 pm, Milpitas Community Library, 40 N. Milpitas Blvd., Milpitas. An informal group to share ideas, PD software, and information. Call: Lawrence Brown, (408)984-6036; Randy Abel, (408)356-9405; toga@cup.portal.com . [Exp. #132.]

Winner's Circle. Meetings: 2nd Wed., Berkeley. Demo new products, chat with other Amiga users. Call: Jack, (510)845-4814; BBS, (510)845-4812. [Exp. #132.]

APPLE

Gravenstein Apple Users. Meetings: 3rd Sat., 10:00 am, Grant School, 200 Grant Ave., Rm. #B4, Petaluma. Call: BBS (707)794-9333, Jack McKenna sysop. [Exp. #129.]

PAUG—Peninsula Apple User Group. Meetings: 3rd Thurs., 7:00 pm, Ampex Cafeteria, 411 Broadway, Redwood City. Beginners and advanced, Q&A, new product demos, public domain software. Call: Kent Fillmore, (415)571-1433. [Exp. #131.]

P.I.E. Apple IIGS SIG. Meetings: 3rd Tues., 7:00 pm, Wilcox High School, Rm. #205, 3250 Monroe St., Santa Clara. Call: Philip Fontaine, (408)258-7641. [Exp. #129.]

San Leandro Apple Eaters Users Group. Meetings: 1st Thurs., 7:30 pm, San Leandro High School, Rm. #204, 2200 Bancroft Ave., San Leandro. Call: Stan (510)351-3973 or Ed (510)651-8521. [Exp. #129.]

SPC Apple User Group. Meetings: 2nd Tues., 7:00 pm, CompUSA, Newpark Mall, Newark (I-880 exit west on Steveson or Morey). The Society for Prevention of Cruelty to Apple Computers Users Group supports all Apple and Macintosh computers. Call: Dean Fearn, (510)881-9160. [Exp. #133.]

Stockton Apple Users. Meetings: 3rd Wed., 7:00 pm, Online Connecting Point Computer Store, 5756 Pacific Ave., Stockton. Call: Connie Fodor, (209)474-8508. [Exp. #129.]

Tri-Valley Apple Users. Meetings: 1st Wed., 7:00 pm, Glendale Federal Bank, 3101 Crow Canyon Place, San Ramon. Call: Jerry Carleton, (510)828-6237. [Exp. #129.]

ATARI

ABACUS—Atari Bay Area Computer Users Society. Meetings: 1st Sat. 12:00 noon, Potrero Branch Public Library, 2nd floor, 1616 20th St., San Francisco. DTP/MIDI/Video games SIGs. Call: Roger Sinasohn, (415)469-7924. [Exp. #129.]

San Leandro Computer Club. Meetings: 1st Tues., 8:00 pm, San Leandro Main Library, Estudillo Room, 300 Estudillo Ave. 8/16/32-bit, SIGs. Call: Robbie, (510)797-5636. [Exp. #131.]

AT&T

AT&T Computer Users Group. Meetings: 1st Wed., 7:00 pm, 50 Fremont St., 40th Floor—near 1st and Mission, San Francisco. Call: Jim Lansing, (415)885-6631 or Joe Mahoney, (415)584-6510. [Exp. #129.]

CAD

BMUG CAD SIG. Meetings: Last Weds., 6:00 pm, Academy of Art College, 79 New Montgomery, San Francisco. Environmental design/drafting. Call: (510)549-BMUG. [Exp. #132.]

MAUG—Marin AutoCAD Users Group. Meetings: 1st Thurs., 6:30 pm, Autodesk, 3950 Civic Ctr. Dr., Demo Room, San Rafael. Call: Priscilla Mills, (415)453-4480. [Exp. #133.]

Sonoma County AutoCAD Users Group. Meetings: 3rd Tues., 6:30 pm, Piner High School, Rm. H-83, 1700 Fulton Rd., Santa Rosa. Call: John Weitzel, (707)525-8147. [Exp. #133.]

COMMODORE

C=HUG (Commodore Hayward User Group). Meetings: 2nd Sat., 2:00 pm, Palma Ceia Park. (510)531-3734. [Exp. #132.]

COW—Commodore Owner's Workshop. Meetings: 3rd Thurs., 7:00 pm, San Bruno. Demos and assistance for all Amiga users. Call: Steve Beale, (415)355-8927; BBS, (415)359-5975. [Exp. #132.]

Diablo Valley Commodore Users Group. Meetings: 3rd Thurs., 7:00 pm, Contra Costa Water District Anteroom, 1331 Concord Ave., Concord. Call: (510)689-3224. [Exp. #132.]

DESKTOP PUBLISHING

BMUG Desktop Publishing And Design SIG. Meetings: 3rd. Tues., 6:30, S.F. Police Academy, 350 Amber, San Francisco. Call: Les Cowan, (415)641-6033. [Exp. #132.]

IBM AND COMPATIBLES

BAYTALK. Meetings: 3rd Tues., 6:00 pm, Sun Peking Restaurant, 2068 Center St., Berkeley. For low-vision and other disabled persons; learn about adaptive technology and develop computer skills. Call: (415)777-4777. [Exp. #131.]

Diablo Valley User Group—DVPC. Meetings: 1st Thurs., 7:30 pm, Bank of America, Bldg. B, Clayton Rd. at Galindo, Walnut Creek. SIGs include Windows, Paradox, Beginner's, Visual Basic, education/entertainment, and more. Call: (510)943-1367. [Exp. #134.]

EastBay FOG. Meetings: 2nd Wed., 7:30 pm, Episcopal Church of St. John-in-Montclair, 1707 Gouldin Rd., Montclair. All microcomputers, MS-DOS, CP/M. Call: (510)653-2627. [Exp. #134.]

F.U.N. PC Users Group. Meetings: 1st Wed., 6:00 pm, CompUSA, Training Room, Newpark Mall, Newark (I-880 exit west on Steveson or Morey). Visitors welcome, no experience necessary. Call: (510)795-4286 #8. [Exp. #133.]

Golden Gate Computer Society. Meetings: 4th Mon., 7:00 pm, San Rafael Community Center, 618 B St., San Rafael. Free intro to computers class at 6:00 pm. Call: (415)454-5556. [Exp. #132.]

Napa Valley PC Users Group. Meetings: 2nd Wed., 7:30 pm, Napa High School Lecture Hall, 2475 Jefferson St., Napa. Call: Lee Schwab, (707)257-2675. [Exp. #130.]

NaSPA Bay Area Chapter. Meetings: Last Tues. of odd-numbered months, 3131 Zanker (near First and Montague), San Jose. Technical aspects of corporate computing with emphasis on IBM and compatible mainframes. Call: Radi Shourbaji, (408)526-3258. [Exp. #131.]

OS/2 BAUG Enterprise Computing SIG. Meetings: 3rd Mon., 7:00 pm, IBM, 425 Market St., 22nd floor, San Francisco. Call: Larry Baptist, (510)675-2466. [Exp. #129.]

PC Clubhouse. Meetings: 1st Fri., 8:00 pm, Meiklejohn Hall, Room 2002, CSU Hayward. To share knowledge and PD/shareware software; maintains network of BBSes; mentor assistance; SIGs. Call: (510)538-2449. [Exp. #132.]

PC Users Group Of The Redwoods. Meetings: 2nd Thurs., 6:30 pm, Santa Rosa Veteran's Memorial Building, East Dining Room, Maple Ave., Santa Rosa. Call: (707)527-USER; or Mel Del Gallo, (707)571-0373. [Exp. #133.]

San Francisco Business Computers. Meetings: 4th Tues., 5:30 pm. 110 Pacific #153, San Francisco. For those who use computers in business. Visitors $10. Call: Jordan Rosenberg, (415)788-

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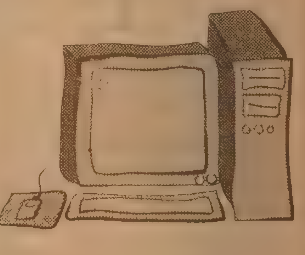

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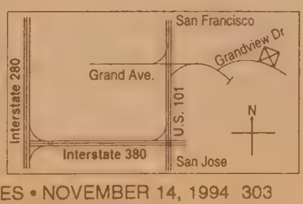

USER GROUPS cont.

5338. MCI Mail: 425-1545. [Exp. #132.]

San Francisco Computer Society. Meetings: 4th Mon., 7:00 pm, Presbyterian Church, 1329 7th Ave., San Francisco. CPM and DOS. Call: Bob Forsberg, (415)885-6202. [Exp. #130.]

San Francisco PC Users Group. Meetings: 3rd Tues., 6:15 pm SIGs, 7:30 pm General Meeting. St. Mary's Conference Center, 1111 Gough St., San Francisco. Call: (415)346-2644, events; Kendall Callas, (415)821-1310; Loyd Cribs, (415)751-5219. [Exp. #132.]

SEF Business Operations SIG. Meetings: 1st Tues., 7:00 pm, Center for Software Development, 111 W. St. John St., Ste. 200, San Jose. A special interest group of the Software Entrepreneurs' Forum. Call: Mike Schmit, (408)244-6826. [Exp. #133.]

SEF International Software SIG. Meetings: 3rd Mon., 7:00 pm, Center for Software Development, 111 W. St. John St., Ste. 200, San Jose. A special interest group of the Software Entrepreneurs' Forum. Call: Charlie Pfefferkorn, (408)923-7570. [Exp. #131.]

South Bay WordPerfect User Group. Meetings: 4th Tues. (no Dec. meeting), Saratoga Community Library, Fruitvale and Saratoga Ave., Saratoga. Free. Call: Scott Maiden, (408)253-4591. [Exp. #131.]

Stanford Palo Alto Area PC User Group. Meetings: Last Wed., 7:30 pm, Varian Auditorium, 3075 Hansen Way (off Page Mil Road), Palo Alto. Call: (415)329-8252. [Exp. #134.]

INTERNET

BMUG Beginning Internet SIG. Meetings: 1st and 3rd Mon., 7:00 pm, BMUG office, 2055 Center St., Berkeley. How to connect and what to do once you're connected. Call: Noah, (510)549-2684 ext. 217. [Exp. #132.]

BMUG GUI Internet SIG. Meetings: 2nd and 4th Weds., 7:00 pm, BMUG office, 2055 Center St., Berkeley. Accessing the Internet through World Wide Web using the Macintosh. Email: dan_meriwether or susan_adrian @bmug.org . [Exp. #132.]

Online And Interactive SIG. Meetings: 3rd Tues., 6:30 pm, usually at Software Publishing Corp., Bldg. 3, 3165 Kifer Rd., Sunnyvale. SIG of the Silicon Valley chapter of the Society for Technical Communication. Call: Charly Rhoades, (408)379-7000 ext. 1414 or charly@hal.com . [Exp. #134.]

LEGAL

BMUG Law SIG. Meetings: 2nd Weds., 6:00 pm, Nossaman, Guthner, Knox & Elliot, 50 California St., 34th floor, San Francisco. Call: Tim, (408)945-0282. [Exp. #132.]

BMUG Law SIG South. Meetings: 1st Tues., 6:00 pm, 2077 Gateway Pl., 1st. floor, Red conf. room, San Jose. Call: Tim, (408)945-0282. [Exp. #132.]

SF Bar Assoc. WordPerfect User Group. Meetings: 3rd Wed., odd-numbered months, noon, SF Bar Assoc. Boardroom, 7th Fl., 685 Market St. Brown bag meetings. Call: (415)421-5650. [Exp. #132.]

MACINTOSH

Association Of A32 Users. Meetings: 2nd Sat., 10:00 am, Sunnyvale Community Center Arboretum, 550 E. Remington Ave. (near corner of El Camino and Fair Oaks). Q&A session; guest speakers and vendor demonstrations; shareware, freeware, and PD software disks. Call: (408)263-0398. [Exp. #133.]

BMUG—Berkeley Macintosh User Group. Meetings: Every Thurs., 6:00 pm, Warren Hall, Rm. 22, UC Berkeley campus. Call: (510)549-BMUG. [Exp. #132.]

BMUG LesBiGay SIG. Meetings: 3rd Sun., 6:00 pm, BMUG office, 2055 Center St., Berkeley. Call: see the LesBiGay conference on Planet BMUG (bmug.org). [Exp. #132.]

BMUG West. Meetings: Last Mon., 6:30 pm, San Francisco Exploratorium. Call: (510)549-BMUG. [Exp. #132.]

Diablo Valley Macintosh User Group (DVMUG). Meetings: 3rd Tues., 7:00 pm, Bancroft School, 2200 Parish Dr., Walnut Creek. Get together with Mac and Performa users. Enjoyable SIG meetings. Call: (510)827-5775. [Exp. #133.]

International Macintosh Users Group (IMUG). Meetings: 3rd Thurs., 7:00 pm, Apple Computer, R&D Campus, 1 Infinite Loop, Cupertino. A forum for multilingual/multiscript computing. Call: Roger Sherman, (415)859-5146. [Exp. #134.]

PAUG—Peninsula Apple User Group. Meetings: 3rd Thurs., 7:00 pm, Ampex Cafeteria, 411 Broadway, Redwood City. Beginners and advanced, Q&A, new product demos, public domain software. Call: Kent Fillmore, (415)571-1433. [Exp. #131.]

SEF Macintosh SIG. Meetings: 3rd Tues., 7:00 pm, Apple Auditorium, 4 Infinite Loop, Cupertino. Sponsored by Software Entrepreneurs' Forum. Call: Jeff Cherniss, (408)358-5150. [Exp. #134.]

SPC Apple User Group. Meetings: 2nd Tues., 7:30 pm, Fremont Main Public Library. The Society for Prevention of Cruelty to Apple Computers Users Group supports all Apple and Macintosh computers. Call: Dean Fearn, (510)881-9160. [Exp. #129.]

MARKETING

SEF Marketing SIG. Meetings: 4th Thurs., 7:00 pm, Cubberley Community Center, Rm. H-1, 4000 Middlefield Rd., Palo Alto. A special interest group of the Software Entrepreneurs' Forum. Call: Bill Ryan, (415)615-7906. [Exp. #131.]

MISCELLANEOUS

California Genealogical Society SIG. Meetings: 2nd Sat. odd months, CGS Library, 300 Brannan St., 4th Fl., San Francisco. All makes, models, and software welcome. Call: Dave Wilma, (415)777-9936 or DaveW50789@aol.com . [Exp. #134.]

MULTIMEDIA

Joe's Digital Diner. Meetings: every other week, 5:30 interactive happy hour, 7:00 pm dinner, 8:00 pm showcase, 3435 Army St., Ste. 222 (at Valencia), San Francisco. An evening mixing home cooking, six multimedia stations, and a special presentation on new media, Internet, etc. Call: (415)824-9394. [Exp. #134.]

SEF Multimedia SIG. Meetings: 1st Thurs., 7:00 pm, Center for Software Development, 111 W. St. John St., Suite 200, Downtown San Jose. SIG of Software Entrepreneurs' Forum. Call: Ralph Gilman, (408)746-0551. [Exp. #131.]

NETWORKING

BMUG Networking SIG. Meetings: 4th Tues., 7:00 pm, BMUG office, 2055 Center St., Berkeley. Call: James, (510)233-7151. [Exp. #132.]

Networking Windows SIG. Meetings: 3rd Wed., El Cerrito. For users of Windows for Workgroups, 95, NT, Advanced Server. Call: (510)528-9895. [Exp. #134.]

SEF Client/Server SIG. Meetings: 4th Tues., 7:00 pm, Cubberly Community Ctr., Rm. H-1, 4000 Middlefield Rd., Palo Alto. A special interest group of the Software Entrepreneurs' Forum. Call: Patrick O'Brien, (415)726-4664. [Exp. #133.]

NOVELL

Diablo Valley NetWare Users Group. Meetings: 3rd Tues., 6:00 pm, Terraces building, 2300 Contra Costa Blvd., Conference Room, Pleasant Hill. Call: Leslie or Tom, (510)825-3275. [Exp. #129.]

Silicon Valley NetWare Users Group. Meetings: 3rd Wed., 6:30 pm, Sundowner Inn, Sunnyvale. Call: (408)954-0585, x590. [Exp. #130.]

South Bay NetWare Users Group. Meetings: monthly, 6:00 pm, 890 Ross Dr., Sunnyvale. Call: Allan Hurst, (415)525-4567 or allanh@spectrum.us.com . [Exp. #134.]

OS/2

OS/2 Bay Area User Group. Meetings: 4th Mon., 7:00 pm. For anyone interested in OS/2. Presentations, product demos, questions and answers. Call: (415)755-3124. [Exp. #129.]

OS/2 Developers SIG. Meetings: 2nd Mon., 7:00 pm, IBM, 1055 Joaquin Rd., Mountain View. Call: (510)945-7565. [Exp. #129.]

PARADOX

bapals (Bay Area Paradox User Group). Meetings: 4th Tues., 5:00 pm, McKesson Building, 1 Post St., 18th Fl., San Francisco. Call: (415)995-4688. [Exp. #131.]

PEN

SEF Pen/Mobile Computing SIG. Meetings: 4th Wed., 7:00 pm, Cubberley Community Center, Rm. H-1, 4000 Middlefield Rd., Palo Alto. A special interest group of the Software Entrepreneurs' Forum. Call: Bill McAlpine, (415)348-2257. [Exp. #131.]

Stanford Newton User Group. Meetings: 2nd & 4th Tues., 7:00 pm, Printer's Inc. Bookstore Cafe, 310 California Ave., Palo Alto. Call: Flash Sheridan, (415)462-9203 or FlaSheridn@rahul.net . [Exp. #134.]

PROGRAMMING LANGUAGES

BMUG Forth SIG. Meetings: 2nd Sat., 12:00 pm, BMUG office, 2055 Center St., Berkeley. Forth for beginners, 12 noon; introductions, 1:00 pm; talks and demos 1:30–5:00 pm. Call: Leonard, (510)376-5241. [Exp. #132.]

BMUG Programmers' SIG. Meetings: alternate Weds., 7:00 pm, BMUG office, 2055 Center St., Berkeley. Mac Toolbox, C, and Pascal. Call: (510)549-BMUG. [Exp. #132.]

Forth Interest Group, North Bay Chapter. Meetings: 2nd Sat., 1–5 pm, tutorial at noon, 2055 Center St., Berkeley. Call: Leonard Morgenstern, (510)376-5241. [Exp. #130.]

SEF Intelligent Systems SIG. Meetings: 2nd Mon., 7:00 pm, Center for Software Development, 111 W. St. John St., Ste. 200, San Jose. A special interest group of the Software Entrepreneurs' Forum. Call: Leor Jacob, (415)595-5200. [Exp. #131.]

SEF Visual BASIC SIG. Meetings: 2nd Thurs., 7:00 pm, Cubberley Community Center, 4000 Middlefield Rd., Rm. H-1, Palo Alto. Sponsored by Software Entrepreneurs' Forum. Call: Allan Colby, (415)851-4567. [Exp. #131.]

Silicon Valley Forth Interest Group. Meetings: 4th Sat., 10:00 am–5:00 pm, 230 Lincoln Centre Dr., Foster City. Call: Dr. C.H. Ting, (415)638-5669 (w), 571-7639 (h). [Exp. #134.]

PROJECT MANAGEMENT

Microsoft Project Users Group. Meetings: 3rd Tues., alternates between San Jose and Foster City. Q&A, speakers, product demos, and other topics related to Microsoft Project and project management. Call: Jim Spiller, (707)425-2484. [Exp. #133.]

TEXAS INSTRUMENTS

TI-99/4A. Meetings: 2nd Sat., Oakland. Call: Fred, (510)530-8335. [Exp. #133.]

UNIX

AT&T UNIX Computer Users Group. Meetings: 4th Wed., 6:30 pm, Location varies. Call: Thad Floyran, (408)985-7100 or Usenet: thad@cup.portal.com [Exp. #129.]

International Linux Association. Meetings: 3rd Mon., 7:00 pm, International House of Pancakes, 5403 Stevens Creek Blvd. (off I-280 Lawrence Expwy. South, next to Howard Johnson Hotel), Santa Clara. Learn/use UNIX, X-Windows, Internet through Linux. See Linux change the computing world. Call: (408)369-9818, email alte@rahul.net . [Exp. #130.]

SEF UniForum Open Systems SIG. Meetings: 2nd Tues., 7:00 pm, DEC Auditorium, 130 Lytton Ave., Palo Alto. A special interest group of the Software Entrepreneurs' Forum. Call: George Bosworth, (415)851-3304. [Exp. #133.]

VIDEO TOASTER

Bay Area Video Toaster Users Group. Meetings: 4th Tues., 7:00 pm, Richmond Public Library, Whittlesey Room, 325 Civic Center Plaza, Richmond. Product demos, guests, info, tips, and much more. Call: Don Smith, (510)620-6759. [Exp. #131.]

Silicon Valley Video Toaster Users Group. Meetings: Last Thurs., 7:00 pm, HT Electronics, 275 N. Mathilda Ave., Sunnyvale. Special guests, equipment demos, hands-on workshops, info/tips on Toaster 4000 and System 3.1. Call: Andrew Timmins, (408)243-9233 (eve.). [Exp. #134.]

WINDOWS

BMUG Windows SIG. Meetings: 1st Tues., 6:30 pm, BMUG office, 2055 Center St., Berkeley. Call: Robin, (510)527-8993. [Exp. #132.]

SEF Windows SIG. Meetings: 1st Wed., 6:30 pm, Cubberley Community Center, Room H-1, 4000 Middlefield Rd., Palo Alto. SIG of the Software Entrepreneurs' Forum. $15 for nonmembers. Call: Fran Finnegan, (415)288-4400. [Exp. #133.]

WIRELESS

SEF Wireless SIG. Meetings: 1st Mon., 7:00 pm, Center for Software Development, 111 W. St. John St., Ste. 200, San Jose. A special interest group of the Software Entrepreneurs' Forum. Call: Patrick Glenn, (408)448-3844. [Exp. #131.]

ASSOCIATIONS

American Association For Artificial Intelligence. A technical society for those interested in Artificial Intelligence. 445 Burgess Dr., Menlo Park. Call: (415)328-3123, fax: (415)321-4457, email: membership @aaai.org or info@aaai.org . [Exp. #132.]

The Assembler Multitude. Meetings: every 3rd week on Mon., 7:30 pm, University Lutheran Church, 1611 Stanford Ave., Palo Alto. An open discussion of new technical developments in many fields and how they relate to nanotechnology. Call: (408)974-6241. [Exp. #134.]

Association For Women In Computing. Meetings: 1st Wed., 6:00 pm, Sinbad's Restaurant, Pier 2, San Francisco Embarcadero. $12 members, $14 guests. Call: (415)979-8450. [Exp. #134.]

Bay Area Sysop Alliance. Meetings: monthly. Help and information for Bay Area BBS systems. To get a BASA notice every month send a message to Jeff Hunter at jhunter@netcom.com with your Internet address, or send your FidoNet address to Jeff Hunter @ 1:161/211. [Exp. #132.]

Bay Area Video Coalition. A place for independent videomakers to communicate with each other and the larger media community. $10 for nonmembers. Call: Anne Etheridge, (415)861-3282. [Exp. #134.]

Black Data Processing Associates, Silicon Valley Chapter. Meetings: 3rd Thursday, 6:30 pm, Amdahl Corp., Bldg. H, 1240 E. Arques Ave., Sunnyvale. National network of DP professionals, educators, students, and vendor reps. Call: Willie Mackey, (408)280-7624. [Exp. #134.]

Business Marketing Association. Meetings: 4th Wed., 11:30 am, Marriott Hotel on Great America Pkwy., Santa Clara. A professional organization for business-to-business marketing professionals; CBC certification, topical programs, seminars, job bank. Call: (408)365-9815. [Exp. #134.]

Center For Software Development. 111 West Saint John, Ste. 200, San Jose. A nonprofit corporation whose goal is to help software businesses grow and bring better products to market more rapidly. Call: (408)494-8378. [Exp. #131.]

Computer Professionals For Social Responsibility/ Berkeley Chapter. Meetings: last Sun., 2:00 pm, BMUG Offices, 2055 Center St., Berkeley. Meetings are open to the public and free. Call: (510)987-0567 or cpsr-berkeley @cpsr.org . [Exp. #130.]

Contra Costa Networking Forum. Meetings: monthly. Creating an electronic community network in Contra Costa County. Call: TEIRNET, (510)689-6016. [Exp. #133.]

Electronic Personal Memory Organizer Development Society. Meetings: 2nd and 4th Tues., 7:40 pm, Mr. Q's, 25 Main St., Tiburon. Free introductory exchange for electronics engineers, investors, and all interested parties. Call: 1-800-386-3477. [Exp. #133.]

Foresight Institute. Meetings: 123 Fremont Ave., Los Altos. Information about and discussion of nanotechnology and other anticipated technologies. $35 annual membership. Call: (415)917-1122. [Exp. #130.]

Historical Computer Society. 10928 Ted Williams Pl., El Paso, TX 79934. A nostalgia group for enthusiasts of older computers and their history. Main forum is *Historically Brewed* newsletter; $18/yr., $3 sample. Call: David A. Greelish, (915)822-2683. [Exp. #133.]

IEEE San Francisco Computer Society. Meetings: monthly, SF State University. Call: (415)905-4400. [Exp. #133.]

Independent Computer Consultants Association, Northern California Chapter. Meetings: 2nd Tues., 6:00 pm, The City Club, 155 Sansome St., San Francisco. Open discussion, questions and answers. Call: (415)399-0305. [Exp. #134.]

Nanosystems Study Group. Meetings: every few months, 7:30 pm, Genentech Conference Center, Bldg. 5, South San Francisco. Call: Ted Kaehler, (408)974-6241. [Exp. #130.]

North Bay Multimedia Association. Meetings: 3rd Thurs. (but September's is on 22nd), 6:00 pm, Indian Valley Campus, Pomo Cluster, Novato (101 to Ignacio Blvd., go west into campus, park in lots 3 or 4). $10 for nonmembers, $75/year membership. Call: Sharon Rockey, (415)721-1780. [Exp. #132.]

North Bay Systems Professionals. Meetings: 3rd Wed., 6:00 pm networking, 7:00 pm dinner, 8:00 pm speaker. Embassy Suites Hotel and Conference Center, 101 McInnis Parkway, San Rafael. NBSP provides a forum for systems professionals to grow and to benefit from a network of other like professionals. Call: (415)721-4409. [Exp. #130.]

Rexx Language Association. A consortium of those who deal at some level with the Rexx language. For membership info send name and address to pjt@wrkgrp.com or RexxLA Membership, 6300 N. River Rd., Ste. 501, Rosemont, IL 60018; fax (708)696-2277. [Exp. #132.]

Smart Valley Breakfast Talks. Meetings: 3rd Tues., 7:30 am, Anderson Consulting Center for Strategic Technology in Palo Alto. Talks focus on topics relating to the information superhighway. $5 for nonmembers. Call: (415)843-2160, email info@svi.org . [Exp. #132.]

Society For Technical Communication, San Francisco Chapter. Meetings: 3rd Wed., 6:00, program at 6:45 pm, Stagecoach Restaurant, 44 Montgomery St., San Francisco. Job listings, guest speakers, technical publications competition, newsletter. Call: (415)985-7121. [Exp. #131.]

Society For Technical Communication, Silicon Valley Chapter. Meetings: 4th Thurs., 5:30 pm refreshments, 6:30 pm dinner, 7:15 dessert. Sunnyvale Hilton, 1250 Lakeside Drive (off Lawrence Expressway at 101). Guest speakers, special interest groups, networking, job listings, newsletter. Call: (408)737-9426. [Exp. #134.]

Software Entrepreneurs' Forum. 3rd Wed., 6:30 pm, Elk's Lodge, 4249 El Camino Real, Palo Alto. Industry association dedicated to software developers and entrepreneurs, offering information and education on all facets of the software industry. Call: Barbara Cass, (415)854-7219. [Exp. #134.]

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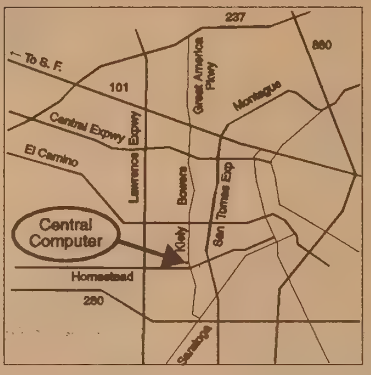

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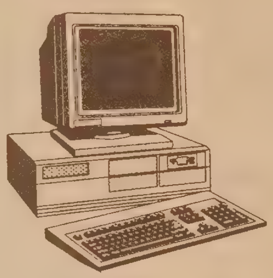

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3. CONTROLLER

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Fast SCSI PCI w. Kit	299
VITEX	
IDE w. I/O (2S 1P) VLB	35
IDE w. 4FD/ 2S 1P/ 16550 chips	49
IDE w. 4FD/ 4S 2P 1G/ 2S16550/ VLB	89
Enhanced IDE/ 4HD/ 2S 1P/ VLB/ 16550	69
WONDER SYSTEM (USA made)	
IDE w. 4FD/ 2.88/ Drivers Tape/ 1.0 Mbps	35
IFSP2 IDE w. 4FD/ 3S 2P 1G/ 2S16550	69
SCSI w. CD Rom Drivers	45
VL2000 IDE w. AT I/O VLB	35
VL2018 IDE w. 2HD/ 4FD/ 16550/ 2.88/ VLB	69
OTHERS	
ACCULOGIC IDE PCI Controller	49
BOCA IDE w. I/O (2S 1P)	49
IDE w. I/O (2S 1P)	19.50
IDE w. I/O VLB	29
SC200 SCSI-2 PCI (w. NCR chips)	85

4. CPU & MATH CO

CPU :	
AMD	
386 DX-40	59
486 DX2-66	209
CYRIX	
486 DX-33	129
INTEL	
386 DX-33 / 40	45/45
486 DX-33 / 50	165/285
486 DX2-50 / DX2-66	199/229
486 DX4-100	599
Pentium 586-60	419
Pentium 586-66	539
Pentium 586-90	649
Math Co Processor :	
CYRIX	
83D87 - 33	39
IIT	
Cx486 DLC TI-40	75
INTEL	
387 DX (for 16 / 20 / 25 / 33 MHz)	85
387 SX (for 16 / 20 / 25 / 33 MHz)	79
ULSI	
83D87 - 40	39
OTHERS	
Cooling Fan for 486 CPU	7.50
Cooling Fan for Pentium 586	15

*(price) .... special , while supplies last

CENTRAL
COMPUTER SYSTEMS INC.
WIDE SELECTION AT LOW PRICES

TEL: 408 241-0185 FAX: 408 241-0390 820 Kiely Blvd., Santa Clara CA 95051 Page 2 / 7

5. DIGITIZER

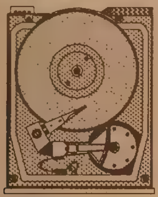
SUMMASKETCH

III 12 x 12, 4 or 16 button	269
III 12 x 18, 4 or 16 button	*(495)549

WACOM

UD-0608R 6 x 8, w. UP-201 Pressure Stylus	345
UD-1212RP 12 x 12, w. UP-201 Pres. Stylus	529
KT-0405R 4 x 5, Art Pad	155
KT-0405R with Fractal Dabler	185

6. DRIVE



FLOPPY DRIVES :

MICRO SOLUTIONS (external)

1.44 (use printer port)	139

SYQUEST (removable)

88MB 3.5" w. cartridge, Int	349
88MB 5.25" w. cartridge for Mac, Ext.	429
105MB 3.5" w. cart., IDE host adapter	279
105MB 3.5" w. cart., printer port for PC, Ext.	369
105MB 5.25" w. cart., SCSI for Mac, Ext.	389
270MB 3.5" w. cartridge, IDE, Int	489
270MB 3.5" w. cartridge, SCSI, Ext.	539
270MB 3.5" w. cart., printer port for PC, Ext.	539
105MB Cartridge / 270MB Cartridge	59/69

TEAC

1.2MB 5.25"	46
1.44MB 3.5" / w. frame	36/40
2.88MB 3.5" w. frame	85
Dual - 1.2MB & 1.44MB	89

HARD DRIVES :

CONNER

CFS-210A 213MB 14ms IDE 1" ht	155
CFS-420A 420MB 14ms IDE 1" ht	195
CFA-540A 540MB 12ms 256k IDE 1" ht	255
CFA-540S 540MB 12ms 256k SCSI	285
CFA-810A 810MB 12ms 256k IDE 1" ht	419
CFP-1060S 1.06GB 10ms 256k SCSI	569
CFA-1080A 1.08GB 9.5ms 256k IDE	515
CFP-2120S 2.1GB 10ms 1/2 ht	1125

DIGITAL

3053L 540MB 9ms 256k 1" ht	269
3210S 2.1GB 9.5ms 1/2 ht	1299
5300S 3.0GB 11.5ms full ht	1699
5400S 4.0GB 11ms full ht	2575

FUJITSU (5 yr. warranty fr. Fujitsu)

M2694ESA 1.0GB 10ms SCSI-2 3.5" 1/2 ht	579
M2694EQA 1.0GB 10ms Wide-SCSI	649

MAXTOR

MXT-7135A 135MB 15ms IDE 3.5"	139
MXT-7345A 345MB 14ms 64k IDE 3.5"	169
MXT-7345S 345MB 15ms SCSI 1" ht	209
MXT-7540A 540MB 14ms 64k IDE	229
MXT-7546A 546MB 12ms 256k IDE	249
Optical Rewritable 1.3GB 19ms SCSI, 4MB Ext.	
Tahiti III MXO-9410000 Drive only	2175
1GB Glass Cart. MXO-2015382 512k sector	165
1GB Glass Cart. MXO-2015384 1024k sector	165
1GB Plastic Cart. MXO-2015383 512k sector	135
1GB Plastic Cart. MXO-2015385 1024k sector	135

MICROPOLIS

MC-4110A 1.0GB 8.5ms 512k IDE 1/2 ht	629
MC-4110 1.0GB 8.5ms 512k SCSI-2 1/2 ht	629
MC-2217A 1.75GB 10ms 512k IDE 1/2 ht	955
MC-2217 1.75GB 10ms 512k SCSI-2 1/2 ht	955
MC-2217AV 1.75GB Audio Visual	1085
MC-2217DW 1.75GB Fast Wide-SCSI	1285
MC-1926 2.1GB 13ms 512k SCSI-2 full ht	1345
MC-1936 3.0GB 11ms 256k SCSI full ht	1975
MC-1936AV 3.0GB Audio Visual	2275

QUANTUM

LPS-270AT 270MB 12ms 128k IDE	179
LPS-270S 270MB 12ms 128k SCSI	195
MV-540A 540MB 14ms 128k IDE	239
MV-540S 540MB 14ms 128k SCSI	269
EM-1080S 1.08GB 9.5ms SCSI-2	569
EM-1440S 1.4GB SCSI-2	799
EM-2100S 2.1GB SCSI-2	1095

SEAGATE

ST-3290A 261MB 16ms 64k IDE	169
ST-3391A 341MB 12ms 256k IDE	189
ST-5660A 546MB 12ms 256k IDE	275
ST-31200N 1.05GB 9ms 256k SCSI-2	579
ST-31220A 1.08GB 12ms 256k	499
ST-12550N 2.14GB 8ms 1M SCSI-2	1249
ST-12550W 2.14GB Fast-wide SCSI	1329
ST-43400N 2.9GB 10ms 512k SCSI-2	1895
ST-15150N 4.3GB 8ms 1M SCSI	2495
ST-15230N 4.3GB 9ms 512k SCSI	2185
ST-41080N 9.0GB 11.5ms 1M SCSI	4565

WESTERN DIGITAL (3 yr. warranty)

WD-2340 340MB 12ms IDE	199
WD-2420 420MB 13ms IDE	215
WD-2540 540MB 12ms IDE	255
WD-2700 700MB 10ms IDE	325
WD-3100 1.0GB 10ms IDE	499

OTHERS

Impression CardDrive (2 slot PCMCIA)	185
Mounting Frame for 3.5" Hard / Floppy Drive	5/5
Removable Case for 3.5" HD IDE / SCSI	39/42

7. I/O CARD

BOCA (fast chip serial)

Bocaboard (IRQ 3,4,5,7,10,11,12,15) - 4 port / 8 port / 16 port	79/119/239

KOUWELL

AT I/O (2S 1P) / AT I/O (2S 2P)	25/29
AT I/O (2S 1P 1G)	25
AT I/O (2S 1P 1G) w. 16550 chips	49
Printer Card	15
Serial Card (XT, AT)	15

QUICKPATH

13 Port I/O w. 4-16550UARTs + Extd. IRQs (2IDE, 4F, 4S, 2P, 1G)	125
4 Serial, 16550UARTs, 8addr, 10IRQs (3,4,5,7,9,10,11,12,14,15)	99

SIIG (5 yr. warranty)

(2S 1P) w. 16550 chips	49

STB 4-COM

4 Serial, 16 bit, 16550, support Com 1-8, IRQ (2,3,4,5,10,11,12,15)	109

VITEX

AT I/O (2S 2P) w. 16550 chips	45

8. KEYBOARD

ANCER (black)

101 Key	42

FOCUS

FK2001 101 Click	42
FK9000 129 Key Programmable	57

MICROSOFT

Natural Keyboard	98

NORTHGATE OMNI

101NI	75
102	79
Ultra T	99

SIIG (5 yr. warranty)

Suntouch Jr. 84 Key Mini	45
Supertouch 101 Click	53
Wavetouch 101 Soft	39

OTHERS

BTC 84 Key Mini	35
Keytronic 101	35
Maxi 101 / Maxi 124	35/57
Mitsumi 101	29

9. MEMORY

DRAM

1MB x 1 - 80ns	6.20
256k x 4 - 80ns	5.50

SIMM

1 x 9 - 60ns / 70ns / 80ns	(1MB)	40/39/38
4 x 9 - 60ns / 70ns	(4MB)	149/142
16 x 9 - 70ns	(16MB)	779
256k x 9 - 70ns / 80ns		14/13
1 x 36 - 60ns / 70ns	(4MB , 72 pin)	169/160
2 x 36 - 60ns / 70ns	(8MB , 72 pin)	330/320
4 x 36 - 60ns / 70ns	(16MB, 72 pin)	615/605
8 x 36 - 60ns	(32MB, 72 pin)	1280
For Mac : 4MB x 8 - 70ns / 80ns		159/155

SIPP

1MB x 9 - 70ns (3 chips)	41

COMPUTER MEMORY (3rd party)

Compaq

for Deskpro 386N - 2MB / 4MB / 8MB	109/199/369
for Deskpro 386SX20 - 2MB / 4MB / 8MB	109/199/369
for Deskpro 386-20e/ 20/ 25e - 4MB	225
for Deskpro 486M - 2MB / 4MB / 8MB	109/199/369
for Prolinea 386-25ZS/ 25S - 2MB / 8MB	105/379
for Prolinea 486-33/ 50/ 25S - 4MB / 16MB	175/639

IBM

for PS/2-50Z/ 55SX/ 65SX/ 70 - 2MB / 4MB	129/229
for PS/2 80-111/ 311/ 121/ 321 - 4MB	225
for PS/2 80-A21/ A31/ A6 - 4MB	229

KINGSTON MEMORY

current price	call

LAPTOP / NOTEBOOK (3rd party)

AST

for Premium Exec - 4MB	199
for Power Exec - 4MB	219

Compaq

for Contura 3/ 20/ 25 - 4MB / 8MB	199/359
for LTE-Lite 20/ 25/ 25C - 4MB / 8MB	229/399
for LTE 286 - 2MB / 4MB	129/195
for LTE 386S20 - 4MB	239
for SLT 286 - 1MB / 4MB	99/239

IBM

for L40SX/ N33SX - 4MB / 8MB	199/399

Macintosh

for Powerbook 140/ 170 - 6MB	255

NEC

for Ultralite Versa Versae - 4MB / 8MB	205/379

Packard Bell

for 386SX - 2MB / 4MB	155/259

Panasonic

for 170/ 270/ 370 - 1MB	99

Toshiba

for CT 380/ 480 - 4MB / 6MB	239/320
for T1600 - 2MB	139
for T2200SX - 2MB / 4MB / 8MB	119/229/379
for T3100SX - 2MB / 4MB	129/209
for T3200 - 3MB	169
for T3200SX - 2MB / 4MB	129/209
for T3400 - 4MB / 8MB	239/449
for T5100 - 2MB	129
for T5200/ T8500 - 2MB / 8MB	129/449
for T6400 DX/ SX/ SXC - 4MB / 8MB	220/379

LASER PRINTER MEM. UPGRADE

JET RAM (3rd party)

for Epson EPL6000 - 2MB / 4MB	155/245
for HP Desk Jet 500/ 500C - 256k	69
for HP Laser Fax - 1MB	80
for HP Laser Jet II/ IID - 1MB / 2MB / 4MB	99/145/235
for HP Laser Jet III/ IIIP/ IIID - 1MB / 2MB / 3MB / 4MB	79/125/169/215
for Panasonic KX-P4410/ 4430 - 1MB / 2MB / 4MB	95/139/229
for Panasonic KX-P4420/ 4450i - 1MB / 2MB / 4MB	99/145/235
for Panasonic KX-P4450 - 1MB	139
for Panasonic KX-P4455 - 2MB	169
for Panasonic KX-P4400/ 5400 - 2MB	185
for QMS PS410 - 1MB / 2MB / 4MB	99/145/235
for QMS PS815/ 825 - 2MB / 4MB	159/249
for Texas Instruments Micro Writer - 1MB	69
for Texas Ins. Micro Laser Turbo XL - 1MB	69

PACIFIC DATA

1-2-4 Plus for HP II/ IID - 1MB / 2MB / 4MB	115/159/249
Pacific 4 for HP IIP+/ IIIP/ III/ IIID - 1MB / 2MB / 4MB	89/135/225
Pacific 4 SIMM for HP4P/ 4MP/ 4+/ 4M+/ 4V - 4MB (MS420) / 8MB (MS820)	165/320
Pacific 4 SIMM for HP 4/ 4+/ 4Si/ 1200C - 4MB (MS400) / 8MB (MS800)	189/375
Pacific 4 SIMM for ProTracer - 8MB	489

10. MODEM & FAX

BOCA

14.4 Fax Data Voice Int	*(135)155
14.4 Fax Int / Ext	*(89)/125
14.4 Pocket Fax	169
28.8 Fax 14.4 Modem Int / Ext	*(169/199)

GVC

14.4 Fax Int / Ext	99/119
PCMCIA 9624 Fax / 144 Fax	99/169

HAYES

Accura 144 + Fax Int / Ext	*(129/149)
Accura 28.8 Fax 14.4 Modem Ext	275
ESP Communication Single port	85
ESP Communication Dual port.	125
Optima 144 Fax Ext	389
Optima 288 B Fax 144 Int	379
Optima 288 V.Fast 144 Fax Ext	435
PCMCIA Optima 144 Fax	*(239)285
SmartCom for Windows	*(47)

INTEL

Faxability software	*(25)
Faxability Plus/OCR 2.0 for Windows	*(75)
PCMCIA 144 Fax	*(199)
PCMCIA 144 International Fax	*(379)
SatisFAXtion w. Faxability Software - 400 144/144 v.42, v.32bis, MNP5 Int	259
- 400e 96/144 4k data buffer Ext	*(289)

MEGAHERTZ

PCMCIA XJ1144 144 Fax w. X-Jack	*(215)
PCMCIA XJ2144 Fax w. X-Jack	*(245)
Pocket P2144 144 Fax	245

MICROCOM

Deskporte ES 28.8 Fast 14.4 Fax Ext	235
Deskporte EP 28.8 Fast 14.4 Fax Ext	*(299)
Microporte 4232bis Fax	465

PRACTICAL PERIPHERALS

Fax Me (turn HP laser to fax receiving)	*(59)
Mini Tower 144FX144 Ext	139
PM144FX144 Int	119
PCMCIA 144 Fax	279
Pocket 144 Fax	299
288 Fax 144 Ext (PC 288 LCD)	349

SHIVA

Net modem/E Ethernet BNC/TP	1475

SMARTLINK (w. AT&T chips)

1414BAV 144 Fax w. Software Int (w. 16550)	75
1914ATU 144 Fax Ext (upgradable to 19.2)	125
1414PAV Pocket 144 Fax	155
1914BAT 19.2/14.4 Fax Int / Ext	99/135
1414BOV-V7 144 Fax/ Voice/ Data Int	119

US ROBOTICS

Courier v32 Terbo Fax 19.2MB w. ASL Int	359
Courier v32 Terbo Fax 19.2MB w. ASL Ext	379
Sportster 144/144 Fax MNP5 Int / Ext	109/129
Sportster 144/144 for Mac Ext	149
Sportster 28.8/14.4 Fax Int	169
Sportster V.34 28.8/14.4 Fax Int / Ext	205/219
Worldport PCMCIA 144 Fax	*(169)189

ZOOM (7yr. Warranty fr. Zoom)

96/96 w. WinFax Lite Int / Ext	99/125
144/144 w. WinFax Lite Int / Ext	119/145
144/144 Fax Modem & Voice Int / Ext	139/169
28.8 V.Fast 14.4 Fax Int / Ext	159/189

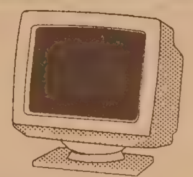
ZY-XEL

U1496B 16.8 Voice 14.4 Fax w. Software Int	289
U1496B+ upgradable to 19.2Kbps Int	397
U1496E 16.8 Voice 14.4 Fax, LED Ext	299
U1496E+ upgradable to 19.2Kbps Ext	399
U1496P Portable 16.8/14.4 Fax 2 line	389

OTHERS

CommShare 550 Phone & Fax Auto-switch	89
CommShare 750 4 Port Switching	109
National Semiconductor TyIN 2000 Int	*(75)
SIIG TeleCommunicator 10-in-1 Fax	219
14.4 Fax modem Int	59

11. MONITOR



ACER VIEW

34T 14" 1024 x 768 .28 NI	259
56L 15" 1280 x 1024 .28 NI	369

ANTEC

CM15GS 15" Black, 1280 x 1024 .28 NI	379

EYE Q

SM1411 14" Flat Mono Amber Paper White	95
CM1438 14" 1024 x 768 .39 Interlaced	199
Z1488N 14" 1024 x 768 .28 NI	249

HITACHI

CM1586MU 15" Flat 1280 x 1024 .28 NI	389
CM1797M 17" Flat 1600 x 1280 66Hz .26 NI	975
NS1764 17" Flat 1280 x 1024 60Hz .26 NI	745

IDEK

MF-8617 17" 1280 x 1024 .26	799

KFC

CT1428A 14" 1024 x 768 .28 NI	249
CA1507 15" Flat 1280 x 1024 .28 NI LED.	375
CA1508 15" Flat 1280 x 1024 .28 NI LCD	389
CA1718 17" Flat 1280 x 1024 .26	745

MAG (auto switch power)

DX15F 15" 1280 x 1024 .28 NI (no LED)	389
DX17F 17" 1280 x 1024 .26 NI (no LED)	689
MX15F 15" MPRII Flat 1280 x 1024 .28 NI	459
MX17F 17" Flat 1280 x 1024 .26 NI	849
Mac Adapter	25

MITAC (3 yr. warranty)

M1564 15" 1280 x 1024 .28 NI	325
M1775 17" 1280 x 1024 .28 NI	639

NANAO

F340iW 15" Flat 1024 x 768 .28 NI	635
F550iW 17" 1280 x 1024 .28 NI	*(879)979
F560iW 17" 1280 x 1024 .26 NI	1199
T560i 17" 1280 x 1024 .25 NI	1445
T660i 20" 1280 x 1024 .31 Trinitron NI	1995
F760iW 21" 1280 x 1024 .31 NI	1915
F780iW 21" 1600 x 1280 .26 NI	3095

(price) .... special, while supplies last

NEC

3FGe 15" 1024 x 768 .28 NI	*(549)
4FGe 15" Flat 1024 x 768 .28 NI	625
5FGe 17" 1024 x 768 .28 NI	995
5FGp 17" 1280 x 1024 NI	1129
6FGp 21" 1280 x 1024 NI	1995
NEC Monitor Lens : Anti-reflection, Anti-static for 4FG / 5FG / 6FG	75/*(99)/185
FG/MacII Cable Adapter Kit	9.95

NOKIA

449E 15" 1280 x 1024 .28 NI	499
447B 17" 1280 x 1024 .25	935
447X 17" 1600 x 1280 .25 NI	1059
445X 21" 1600 x 1280 .26	2485

OPTIQUEST

1000S 14" 1024 x 768 .28 NI	269
1500D 14" 1280 x 1024 .28 NI	349
2000DC 15" 1280 x 1024 .27 NI	399
4000DS 17" 1280 x 1024 .27 NI	725
4000DC 17" 1280 x 1024 .27 NI	755
4000TC 17" 1280 x 1024 .25 Trinitron NI	825

PROTON

PM1561A 15" 1280 x 1024 w. speakers built-in	355

SIIG

9" VGA Mono Paper White 640 x 480	135

SONY

15SF 15" 1280 x 1024 .25 NI	439
17SE 17" 1600 x 1280 .25 NI	965
1730 17" 1024 x 768 .25 NI	915
20SE 20" 1280 x 1024 .30 NI	1835

STANDARD TECHNOLOGIES

400-M 14" VGA Paper White	109
428-VESA 14" 1280 x 1024 .28 NI	249

VIEWSONIC

6e 14" 1024 x 768 .28 NI	275
14e 14" 1024 x 768 .28 NI, MPRII	349
15 15" Flat 1280 x 1024 .28 NI	419
15EX 15" Flat 1024 x 768 .28 NI, MacII	389
17 17" 1600 x 1280 .27 NI, MacII	899
17G 17" 1280 x 1024 .28 NI	799
20 20" 1600 x 1280 .28 NI, MacII	1479
21 21" 1600 x 1280 .26 NI, MacII	1669
Mac Cable Adapter	35

12. MOTHERBOARD

AIR (w/o cpu)

486-DX2-66 256k, 3VLB slots, built-in AT I/O	189
486-33 / DX2-66 256k, EISA, 3VLB slots	349
486SH - 33 / DX2-66 256k, Green PC	145
586-60 256k, PCI ISA VLB, built-in AT I/O	385
586-60 256k, PCI EISA VLB, Fast-wide SCSI.	615

AMI (w/o cpu)

Super Voyager II 486-33 256k VLB, 7 slots	355
Super Voyager II 486-DX2-66 VLB, 7 slots	355
Enterprise IV 486-33 256k EISA VLB	465
Enterprise IV 486-DX2-66 256k EISA VLB	465
586-90MHz PCI 256k w. IDE I/O	499

ASUS (w/o cpu)

486-DX2-66 256k PCI, built-in IDE+SCSI I/O	275
586-60 / 66 256k PCI EISA, built-in SCSI I/O	485
586-90 / 100 256k PCI EISA, built-in SCSI I/O	855

IBM (OPAL)

486BL3X-75MHz VLB w. CPU & Math Proc	269
486SLC-66 VLB w. CPU & Math Proc	185

INTEL (w/o cpu)

586-90MHz 256k PCI, built-in IDE I/O	369

LYNX (USA made, w/o cpu)

486-33 / DX2-66 256k VLB Green PC.	135

MICRONICS (w/o cpu)

BCP 386-33 64k, 4MB max	85
486-33 / DX2-66 256k VLB	215
JX30 486-DX2-66 256k VLB w. Zif socket	259
486 - 33 / DX2-66 256k EISA VLB	475
486-DX2-66 256k EISA E2	395
586-60 256k, ISA PCI, 3PCI slots	415
M5PE 586-60 / 66 256k EISA	595
M54PI 586-90 w. IDE I/O (Neptune)	465

NICE (w/o cpu)

486-33 / DX2-66 256k VLB, Green PC	149
486-50 / DX2-66 256k Mini EISA VLB	225
486-50 / DX2-66 256k EISA VLB	315

SUPER P54VL-PCI (w/o cpu)

Pentium P54VL-PCI 586-90 256k Flash Bios	369

TIGER V

586-90MHz 256k PCI	369

OTHERS (w/o cpu)

486-33 ISA 128k / 256k	105/119

13. MOUSE & JOYSTICK

AGILER

ATB-610 Serial Trackball	21.50
Master Plus 400	16.50

ANCER (black)

3-button	19

KENSINGTON

Expert Bus 4.0	119
Expert Serial & Trackball 4.0	99

LOGITECH

Cordless II	85
Cyberman 3D Controller	*(55)
First Serial	31
Fotoman Plus Camera for PC & PS/2	549
Mouseman Bus	64
Mouseman Serial	47
PG15 Bus oem	45
Trackman II	75
Trackman Portable	55

MICROSOFT (USA made)

Bus 2.0 400dpi oem / w. Bus Card	43/65
Bus 2.0 w. Expansion Card	79
Home Serial 1.0	44
PS/2 2.0 (round connector)	59
PS/2 & Serial Mouse 400dpi oem	45
Serial 2.0 400dpi oem : gray / white	29/35

MOUSE SYSTEMS

Altes	9.95
Cobra (joystick)	9.95
Mouse! Serial w. Pad	19
PC Mouse (3-button optical)	39.50
PC Trackball II	45
Serial Bus Card (9IRQs)	29
The New Mouse 400dpi (3-button)	39

JOYSTICK :

THRUSTMASTER

ACM Gamecard	29
F-16 FLCS	135
Flight Control System MK II	75
Flight Control System Pro	119
Flight Stand Holder	19
Formula T1 (drive control)	129
Rudder Control	115
Weapon Control MKII	109
UPROM	29.95

OTHERS

Comfy Keyboard (for age 2-6, hardware & s/w)	97
Dexxa Serial	19.50
Quickshot Smart Game Card	16.50

14. NETWORK

3COM

3C503 Etherlink II 16 bit coax / TP	165/175
3C509 Etherlink III coax / 5 pack	118/529
3C509 Etherlink III TP / 5 pack	119/*(499)
3C509 Etherlink III Combo	139
- 5 pack / 20 pack	559/1895
3C509 TPO for TP only 5 pack	449
3C529 Etherlink III for MCA coax / TP	235/239
3C579 Etherlink III EISA coax / TP	228/229
3C589 PCMCIA TP	199
3C589 PCMCIA Combo	249
3C16170 Link Builder (12TP)	359
3C16270 Link Builder (12TP + AUI)	345
3C16060 Link Builder FMSII Bridge	529
3C16670 Link Builder FMSII 12 Port	599
3C16671 Link Builder FMSII 24 Port	995
Transcend Link Builder FMS Management	350

ADDTRON

AE-200JL BNC & TP	55
AE-200LC BNC & TP	52
ET-200STS NE2000 coax (BNC + AUI)	*(49)
HUB: UTP8/L (8TP + 1BNC)	155
HUB: UTP16 (16TP + 1BNC) + 1AUI)	399
Pocket Adapter BNC	115
Pocket Adapter TP	119
Transceivers: ET10TB (TP<->AUI)	39
Transceivers: ET10CB (BNC<->AUI)	39

ALLIED TELESIS (CentreCOM)

AT-1500T	*(69)
AT-1700T TP	79
Transceivers: MX10	42
Transceivers: 210T	42

ARTISOFT (Lantastic)

Articom	*(99)
Central Station II	399
Corstream Server 5-user	625
Corstream Server 5-user + Eagle EP3210	775
Corstream Server 10-user + Eagle EP3210	1495
Lantastic Z (2 stations)	89
Lantastic 6.0 Starter Kit coax 2-user	*(235)
Lantastic 6.0 Add On NR-SI 2000C	*(115)
Lantastic 6.0 Add On NR-SI 2000T	125
Lantastic 6.0 Software single user	79
- 6.0 for 5-user / 10-user	339/599
- upgrade for single	39
- upgrade for 5-user	*(99)129
Lantastic for OS/2	call
Lantastic for TCP/IP single / 5-user	199/785
NR2000C BNC only (Lantastic 5.0)	167
NR2000T RJ45 only (Lantastic 5.0)	169
NR-SI 2000C coax / 5 pk / 10 pk	79/375/685
NR-SI 2000T TP / 5 pk / 10 pk	84/379/689
NR-SI 2000A Combo	115
NR-SI 2000M for MCA	139
Remote Boot ROM for NR2000	45
Eagle Ethernet Cards :	
- Eagle EP2000 coax / TP	89/85
- Eagle EP3210 coax / TP	165/159
- Eagle NE2000 Plus Ethernet coax / TP	92/89
- Eagle NE3200 EISA coax w. TPA (FS)	465
- Eagle NE3210 EISA 32 bit Combo	199
- HUB: 8 Port TP (8TP + 1BNC)	225
- HUB: 12 Port TP (12TP + 1BNC)	355

ASANTE (for Mac & PC)

AH1012 Intelligent HUB 12 Port	875
10T HUB 8 Port	255
10T HUB 12 Port (12TP + 1BNC + 1AUI)	495
FriendlyNet with AUI / BNC /TP	69

BOCA

HUB: 8 Port TP only	149
HUB: 16 Port TP only	269
LAN Card ISA Combo	69
LAN Card VLB TP	75
PCI 32 bit Ethernet Combo	89
PCMCIA 10BT Ethernet	169

CASTELLE

JetPress (network Print server) for HP II. IID, III, IIID, coax + TP	429
LANPress (print server connects up to 4 printers)	
- Ethernet Thick/Thin coax (1P 3S)	475
- Ethernet 10BaseT (1P 3S)	475
- Ethernet BNC & 10BaseT (2S 2P)	435

CeLAN

Flex HUB Ethernet SNMP	call
Repeater : coax 2 port	225

DCA

Crosstalk 2.1 for Windows	109
Communicator	58
IRMA Workstation Dos / Win	225/359
IRMA 3270 for MacII/ LC/ SE	735

DIGIBOARD

network products	call

FARALLON

PN381 PhoneNet w. Timbuktu for Win	259

IBM

Ether 16 coax / TP	89/85
Ether 16 Combo	95
PCMCIA 10B2	255
PCMCIA 10BT	235

INTEL

EtherExpress 16 TP / 5 pk	109/495
EtherExpress 16 Flash coax	118
EtherExpress 16 Flash TP / 5 pk	119/545
EtherExpress 16 Flash Combo / 5 pk	135/625
EtherExpress 16 MCA coax / TP	175/185
EtherExpress 32 EISA coax (FS)	439
EtherExpress 32 Flash EISA Combo (WS)	229
EtherExpress Pro 8/16 bit cards :	
- PCLA 8200 BNC + AUI + TP	129
- PCLA 8200 5 pack	559
- PCLA 8210 BNC + TP	115
- PCLA 8210 5 pack	499
- PCLA 8220 TP / 5 pk	109/469
- PCLA 8205 Flash BNC+AUI+TP	139
- PCLA 8205 5 pack	599
- PCLA 8215 Flash BNC + TP	125
- PCLA 5 pack	549
- PCLA 8225 Flash TP / 5 pk	119/509
HUB: 12 Port EtherExpress ISA	565
HUB: 12 Port EtherExpress EISA	645
LAN Project 1.5 (virus protection)	685
LAN Sight Support 4.0	345
LAN Spool s/w 386 NLM v3.5A	425
Netport II Thin & Thick	395
Netport II 10BT	399
Netport Express XL	465
NetSatisfaxtion 2.5 for Novell	955

LANPRO

2000JC 16 bit BNC only	45
2000JT 16 bit TP w. cable	45
2000JA 16 bit Combo	49
Dos 7 + 2000JC	75
EP3010A Pocket Combo	129
HUB ER5390: 8 Port (9TP + 1BNC)	169
HUB ER5396: 16 Port (17TP + 2BNC)	355
Personal Netware coax 1 user Kit	84
Personal Netware coax Starter Kit	149

NATIONAL SEMICONDUCTOR

InfoMover NE2000+ coax	85
InfoMover NE2000+ 5 pack	399
InfoMover NE2000+ TP	79
InfoMover NE2000+ 5 pack	355
InfoMover NE2000+ Combo	99
InfoMover NE2000+ 5 pack	475
InfoMover NE4100 PCMCIA coax	175
InfoMover NE4100 PCMCIA TP	179

NOVELL

Dos 7 (w. Personal Netware) oem / reg.	45/55
EPROM for NE2000	35
Lan Workplace 4.2 single / 10-user	275/1295
Microdyne NE2000+ coax / 5 pack	*(75/349)
Microdyne NE2000+ TP / 5 pack	*(69/319)
Microdyne NE2000+ Combo / 5 pack	*(85/389)
Microdyne NE3200 EISA coax / TP	450/450
Netware 3.12	
- 5 / 10 / 25-user	615/1395/2085
- 50 / 100 / 250-user	2695/3995/6995
Netware 4.02	
- 5 / 10 / 25-user	825/1795/2625
- 50 / 100 / 250-user	3595/5495/9695
Netware Management Agents	335
Netware NFS v1.2C	3150
NFS Client for Lan Workplace	205
Personal Netware oem / reg	45/75
Personal Netware 5-user Kit	265
Unixware Personal Edition - CD version	175
Unixware SDK v1.1 - CD version	75
Unixware NFS	135

SMC (Western Digital)

8003 Plus Elite 8 bit coax / TP	99/99
8013 Plus Elite 16 coax / 6 pk	118/595
8013 Plus Elite 16 TP / 6 pack	119/599
8013 Plus Elite 16 Combo / 6 pack	139/775
8013 Plus/A for MCA	*(175)
8013 Plus/A for TP	199
8 Port Concentrator (8TP + 1AUI)	335
12 Port Concentrator (12TP+2AUI+1BNC)	595
Elite Ultra 16 coax oem / reg	89/109
- 6 pack	*(489)535
Elite Ultra 16 TP oem / reg	88/108
- 6 pack	*(455)495
Elite Ultra 16 Combo oem / reg	99/119
- 6 pack	*(549)585
Elite Ultra 32 EISA Combo	215
Etherpower TP PCI	185
Etherpower Combo PCI	199
Netware Boot ROM for Ethernet	34
Tiger HUB: 3206TA 6 Port	199

SYNOPTICS

Network products	call

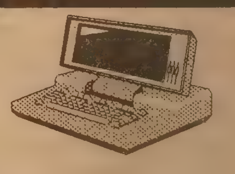
XIRCOM

PCMCIA CE-10B2 coax	*(235)
PCMCIA CE-10BT TP	*(229)
PCMCIA CE-10BC Combo	*(275)
PE3-10B2 Pocket Adapter coax	*(255)285
PE3-10BT Pocket Adapter TP	*(259)289
PE-3 10BC Pocket Adapter Combo	*(295)325
PEM-10BT w. Modem	*(299)

OTHERS

CD Link Access for Novell Netware	
- 5-user / 10-user / 25-user	79/159/225
CABLES & ACCESSORIES :	
10BaseT, Level 3 plenum 1000'	165
Crimping Tools	call
Belden 8259, RG58 1000'	165
RG58 U 500' / 1000'	59/99
RG58 A/U 500' / 1000'	75/129
Twisted Pair 2-pair, PVC, Level 3	
- 500' / 1000'	45/59
Twisted Pair 4-pair, PVC, Level 3	
- 200' / 500' / 1000'	35/55/89
Twisted Pair 4-pair, PVC, Level 5	135

15. NOTEBOOK



TOSHIBA

T1960CS 486-DX2-50, 4MB RAM, 200MB HD, 1.44BM FD, Dual Scan Color	2479
T1960CT 486-DX2-50, 4MB RAM, 200MB HD, 1.44MB FD, Active Color	3099
T1960CT 486-DX2-50, 4MB RAM, 320MB HD, 1.44MB FD, Active Color	3329
T3600CT 486-DX2-50 8MB RAM, 250MB HD, 1.44MB FD, Acitve Color	4199
T4700CT 486-DX2-50, 8MB RAM, 200MB HD, 1.44MB FD, Active Color	4899
T4700CT 486-DX2-50, 8MB RAM, 320MB HD, 1.44MB FD, Active Color	5129

OTHERS

3600 Pentium 586-60 / 66, 16k cache, 8MB RAM, 250MB HD, 1.44MB FD :	
- w. Active Color 60Mhz	4075
- w. Active Color 66MHz	4275
- w. Dual Scan Color 60Mhz	2995
- w. Dual Scan Color 66Mhz	3195
- VLB Docking Station	475
ACC9400 9.5/10.4" Viewable Screen size, 128k, 4MB (expandable to 36), VLB w.1MB video ram, removable HD, built-in speaker & microphone :	
- 486-33, 250MB(DSTN)	1995
- 486-33, 250MB (TFT)	2969
- 486-DX2-66, 250MB (DSTN)	2025
- 486-DX2-66, 250MB (TFT)	2999
- 486-DX4-100, 250MB (DSTN)	2395
- 486-DX4-100, 250MB (TFT)	3359

(price) .... special, while supplies last

16. POWER SUPPLY

AMERICAN POWER CONVERSION

APC-400 Smart-UPS (286, 386 WS)	289
APC-600 Smart-UPS (386, 486 FS)	359
APC-900 Smart-UPS (386, 486, FS & WS)	515
APC-1250 Smart-UPS (multiple FS & WS)	639
APC-2000-2 2 Smart-UPS	1150
APC-400 Back-UPS (300W)	175
APC-450 Back-UPS (325W)	209
APC-600 Back-UPS (425W)	285
APC-900 Back-UPS (650W)	375
APC PowerChute Plus :	
- for Novell	65
- for OS/2, Lan Server, 3 Com	75
- for Unix / Xenix	99
- for Windows NT	69
Power Doctor (DOS) I/F Kit for Smart-UPS	79
Surge Arrest Unit	call

PC POWER COOLING

Standard 220	
- for Desktop	85
- for Full Tower	85
Silencer 270	
- for Slim (baby or mid tower)	135
- for AT Desktop	165
- for Full Tower	159
Turbo Cool 300	
- for Slim (baby or mid tower)	139
- for Desktop	175
- for Full Tower	169
Turbo Cool 450	
- for Desktop	325
- for Full Tower	315
Twinpower 900 (redundant)	925

TRIPP LITE

Isobar 4	*(29.95)
Isobar 6 w. Fax Modem Protection	*(45)
Isobar Console CC16 Plus w. RJ11	75
Isotel 4 w. RJ11	*(39.95)

OTHERS

250W for Baby AT	45
250W for Baby or Mid Tower	45
250W for AT / for Full Tower	47/49
300W for Full Tower	69
550W for UPS	279
1200W for UPS	659

17. PRINTER

BROTHER

HJ-400 Desktop Ink Jet for PC or Mac	259

CANON

BJ-200E Ink Jet	265
BJC-600 Ink Jet Par. 360dpi	535

CITIZEN

GSX-145 24 pin, 132 column	355
GSX-220 24 pin (w. free color kit)	185
GSX-230 Fonts & Quiet	219
GSX-240 Scalable Fonts & Quiet	285
Projet II Ink Jet	279
Accessories :	
- Color Option for GSX-130	45
- Color Option for GSX-145	65

DEC (Digital Equipment)

Printers	call

EPSON

Stylus Color Inkjet 720dpi	*(549)

HP (Hewlett Packard w. toner)

Color Laser Jet	5495
Desk Jet 540	289
Desk Jet 500C	365
Desk Jet 560C	529
Desk Jet 1200C PC, Mac	1379
Desk Jet 1200C Postscript PC, Mac	1995
Laser Jet 4+ / 4M+	1389/1899
Laser Jet 4L / 4ML	639/985
Laser Jet 4P / 4MP	939/1355
Laser Jet 4Si / 4SiMX	2875/4095
Laser Jet 4V / 4MV	1895/2749
Accessories :	
- Color Kit for 540	49
- Duplex C2061A for 4Si or 4SiMX	495
- Envelope Power Feeder 75 Sheet (HP4)	279
- J2550A Jet Direct TP	329
- J2552A Jet Direct Combo	395
- Legal, Letter or A4 250 Sheet Tray (HP4)	99
- Legal, Letter or A4 500 Sheet Tray (HP4)	109
- Lower Cassette w. Letter Tray (IIP, IIIP)	149
- Optional 500 Sheet legal Letter A4 (HP4)	279
- Postscript for LJ4	329
- Postscript C2013A for 4Si	575
- Toner for II, III	84
- Toner for IIP, IIP+, IIIP	76
- Toner for 4	99
- Toner for 4L or 4P	69
- Toner for 4Si	135

LASER MASTER

Win Printer 800 Postscript	1075
Win Printer XL600 11x17, 600x660ppi	2350
Winjet 1200 (postscript for HP4)	*(650)
Winjet 1200+ (postscript for HP4+)	*(675)775

MICROTEK

TrueLaser MTP-306 35 fonts, 6ppm, 2MB	*(795)

NEC

Super Script 610 Laser 6ppm, 300ppi	499

OKIDATA

ML184T 9 pin, Par	229
ML320 9 pin, Epson compatible	325
ML380 24 pin, Epson compatible	235
ML590 24-wire	429
OL410E Laser 4ppm, 600ppi	*(645)
OL410E/PS Laser Postscript	895

PACIFIC DATA

ProTracer II Ink Jet (CAD Plotter) a4 to A2 size, 360dpi, I960RISC, 512k, 45dBA	979
ProTracer II-GL2 w. HP-GL2 & 2MB	1369
Accessories :	
- HP-GAL Emulation Card	375
- Ink Cartridges	19.50
- Postscript Emulation Card	375
- Sheet Feeder I / II	135/115

PANASONIC

1150 9 pin, 55dBA	139
1624 24 pin	379
2023 24 pin, Quiet	185
2123 24 pin, 43.5dBA, Color capability	239
2124 24 pin, 43.5dBA, Color capability	319
2130 Quiet dot matrix .... (after rebate 179)	209
2135 Quiet dot matrix Color (after rebate205)	255
3123 Scalable Fonts , 24 pin, Quiet	259
3124 Scalable Fonts , 24 pin , LCD	329
3624 24 pin, 46.5dBA, Quiet	399
J250 Ink Jet , 300dpi, 128 nozzle printhead	*(259)
4410 Laser 5ppm, 512k	479
- Corona KX-PCR3	49
- Developer KX-PPD / KX-PDP5	110/125
- Drum KX-PDM4 / KX-PDM5	99/109
- Extra Cassette KX-PKC2	45
- Fonts Card KX-P47X	95
- Fuser Unit KX-PFS5	105
- Optional Second Cassette KX-P495	135
- Toner KX-P453	42
4420 Accessories	
- Developer KX-PDP2	95
- Drum KX-PDM2	99
- Envelope Tray KX-P431	59
- Legal Tray KX-P425	45
- Ozone Filter KX-PFT2	29
- Toner KX-P451	42
4430 Laser 5ppm, 1MB	665
- Accessories same as 4410	
4400 Led Page	499
- Apple Talk Interface KX-P412	179
- Drum Unit KX-PDM6	95
- Postscript Upgrade Board KX-PSU3	399
- Postscript Fax option KX-PFX1	259
- RS232 Serial Interface KX-P411	95
- Toner Kit KX-P445	17.50
4440 Laser 10ppm	995
4450 & 4450i & 4455 Accessories	
- Developer KX-PDP1	95
- Drum KX-PDM1	145
- Envelope Tray KX-P430	59
- Legal Tray KX-P420	45
- Ozone Filter KX-PFT1	32
- Toner KX-P450	42
4455 Postscript 11ppm	1695
5400 Led Postscript Page 4ppm	799
- Accessories same as 4400	
Other Accessories :	
- 32k Buffer Dot Matrix KX-P43	65
- Auto Sheet Feeder for 1124 KX-P36	120
- Color Upgrade Kit KX-PCK11	55
- Serial Interface Card PS-13	75
- Single Bin Cut Sheet Feeder KX-PT10	95

SEIKO

Smart Label Printer Plus	*(129)
Smart Label Printer Pro	245
- Standard Label (2 rolls)	7.95

SUMMAGRAPHICS (Plotter)

DMP-60 A to D Size	1275
DMP-61 A to D Size	1275
DMP-161 A to D size	1599
DMP-162 A to E size pen	1899
Hiplot 7100 A to D w. stand	1999
Hiplot 7200 A to E w. stand	2355

TEXAS INSTRUMENTS

Printers	call

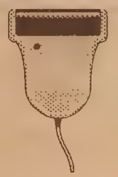
LASER PRINTER ACCESSORIES

PACIFIC DATA

25 in One! for HP DJ500	99
25 in One! for HP II, IID, IIP, IIP+, III, 4Si	245
Complete Font Library for HP III, IIID, IIIP	255
Font Bank for all HP Lasers (stores soft fonts) 0.75MB / 1.5MB	205/269
Pacific Connect XI :	
for HP II, IID, III, IIID -	
- 5 Port 256k / 1MB (4S 1P)	309/379
- 10 Port 256k / 1MB (10S)	449/519
for HP 4, IIISi, Paint Jet XL300 -	
- 7 Port 1MB / 4MB (6S 1P)	449/649
- 10 Port 1MB / 4MB (10S)	519/179
Pacific DirectNet for Novell	369
Pacific DirectNet for Novell, Unix & Ethertalk	299
Pacific DirectNetEX for Novell & TCP/IP	469
Pacific 4, Postscript for HP 4	259
Pacific Page 2MB, Postscript for HP II	365
Pacific Page II/XL 4MB, Postscript for HP II	699
Pacific Page PE for HP IID,IIP,IIP+,III,IIID,IIIP	279
Pacific Page PE 2MB	385
Postscript 4MB PE/XL for HP III	699
Plotter in a Cartridge for HP II	225
Plotter in a Cartridge PE for HP IID, IIP, IIP+, III, IIID, IIIP	225

For other laser printer memory .... see sec.#9

18. SCANNER



AVISION (flatbed color)

Superior 24 bit, Color/ 256 Gray/ SCSI interface	
- AV600 / AV680 w. Lphoto Plus	509/649
- AV660 / AV680 w. Photoshop 2.5	725/845

HP (flatbed color)

ScanJet IICX Color w. Kit	935
- Auto Document Feeder	475
ScanJet IIP w. Kit (gray scale)	499

LOGITECH (hand)

Scanman Easy Touch w. OCR	179
Scanman 256	135
- w. Omni Page OCR	155
Scanman Color	245
- w. Omni Page OCR	265
Scanman Power Page	399

MICROTEK (flatbed color)

Scan Maker II w. Photoshop L.E.	565
Scan Maker IISPX 300 x 600 dpi	899
Scan Maker III	2495

TAMARACK (flatbed color)

ArtiScan 24 bit, Color / 256 Gray Levels / SCSI-interface / for PC or Mac	
- w. Photoshop. & OCR 600 / 800 / 1200 dpi	485/585/855
- w. Photostyler 600 / 800 / 1200 dpi	655/755/1025
- w. Photoshop 2.5 600 / 800 / 1200 dpi	655/755/1025
Slide Scan Kit (transparency, slide, X-ray) 600 / 800 / 1200 dpi	525/525/595

OTHERS

Fax Scanner (turn fax into scanner)	*(29)
Omni Scan 256 for Win	*(259)

19. TAPE BACKUP

COLORADO

DJ-20 250MB QIC-80	155
- 3M DC2120 Tape Cartridge	14.50
- AB-11 External Tape Port	35
- Cable (2FD & tape backup)	6
- FC-20 Controller	69
- KE-09 External Kit w/o Controller	59
- TC-15 Controller w. Data Compression	155
- Unix / Xenix Driver	99
PT-10 PowerTape 1GB SCSI Int	599
PT-25 PowerTape 2GB 300Kb/s Int	965
PTE-25 PowerTape 2GB Ext	1095
PT-50 PowerTape 4GB 300Kb/s Int	1525
PTE-50 PowerTape 4GB Ext	1655
Tracker 250MB (printer port)	285

CONNER

CNR-C250MQPT 250MB Ext	315
CNR-2150S 250MB Int	325
CNR-2525S 525MB Int	469
CNR-4320RT 2GB Int	745
CNR-4350XT 2GB Ext	985
CNR-4324RP 4GB Int	849
CNR-4354XP 4GB Ext	1145
Tape Stor 250MB w. 3M Cartridge	145

EXABYTE

EXB-2501 750MB - 1.5GB SCSI-2 Int	515
EXB-2501 750MB - 1.5GB SCSI-2 Ext	685
EXB-4200 4mm Dat. 2GB Int	845
EXB-4200 4mm Dat. 2GB Ext	995
EXB-8205 8mm Dat. 2.5 - 5GB Int	1375
EXB-8205 8mm Dat. 2.5 - 5GB Ext	1645
EXB-8505 8mm Dat. 5 - 10GB Int	2085
EXB-8505 8mm Dat. 5 - 10GB Ext	2350
FS1G w. Control Kit (2501 drive, Adaptec 1522, cables, cartridge, s/w) Int / Ext	699/899

HEWLETT PACKARD

35480 4mm Dat . 8GB SCSI Int	945

IOMEGA

250MB Insider 3.5" w. 5.25" frame	175

OTHERS

Sytos Plus Backup s/w for Dos / Win	99/95
Tape Cartridges : 3M, Exabyte, Sony	call

20. VGA CARD

ATI

Graphics Ultra Plus 2 DRAM w. mouse	199
Graphics Ultra Pro 2 ISA w. mouse	265
Graphics Ultra Pro 2 VRAM VLB	265
Graphics Ultra Pro 2 EISA	325
Graphics Ultra Pro 2 PCI oem / reg	289/315
Graphics Pro Turbo 2MB PCI / VLB	379/379
Graphics Pro Turbo 4MB PCI / VLB	589/589
Graphics Wonder 1MB ISA	135
Graphics Wonder 1MB VLB	139

DIAMOND

Stealth 32 2MB PCI	199
Stealth 32 2MB VLB	199
Stealth 64 2MB DRAM PCI / VLB	225/225
Stealth 64 2MB VRAM PCI / VLB	339/339
Stealth 64 4MB VRAM PCI	469
Stealth 64 4MB VRAM VLB	469
Stealth Pro VRAM 1MB VLB	235
Stealth Pro VRAM 2MB VLB	315
Viper P9000 VRAM 2MB VLB	325
Viper SE VRAM 2MB PCI oem / reg	299/379
Viper Pro VRAM 2MB PCI	399
Viper Pro VRAM 2MB VLB	399

MATROX

IMP/3AH 1600 x 1200, 3MB ISA	699
IMP/3VH 1600 x 1200, 3MB VLB	699
IMPRO Pro 1600 x 1200, 2MB PCI	415
VLB/2 1280 x 1024, 2MB VLB	425
VLB/2 Plus 1600 x 1200, 2MB VLB oem	425
PCI/2 1600 x 1200, 2MB PCI	399
PRO/4.5ZV 1600 x 1200, 8MB VLB	1359
Upgrade/2 2MB Memory	215

MEDIA VISION

ProGraphics 1024 VL 256 Color 1MB	*(199)239
ProGraphics 1024 VL 16m Color 2MB	*(285)339
ProGraphics 1280 4MB	675

NUMBER NINE

T134020, 1280 x 1024, 90Hz, S3-928 chip	
- GXe Level 10 VRAM 1MB ISA	259
- GXe Level 11 VRAM 2MB ISA	335
- GXe Level 11 VRAM 2MB VLB	339
- GXe Level 12 VRAM 3MB ISA	395
- GXe Level 12 VRAM 3MB VLB	405
- GXe Level 14 VRAM 4MB ISA	599
- GXe Level 14 VRAM 4MB VLB	599
GXe-64 DRAM 1MB PCI	195
GX4-64 DRAM 1MB VLB	195
GXe-64 DRAM 2MB PCI	249
GXe-64 DRAM 2MB VLB	249
GXe-64 Pro VRAM 2MB PCI	349
GXe-64 Pro VRAM 2MB VLB	349
GXe-64 Pro VRAM 4MB PCI	529
GXe-64 Pro VRAM 4MB VLB	529

ORCHID

Kelvin 64 Windows Accelerator 1MB PCI	155
Kelvin 64 Windows Accelerator 1MB VLB	155
Kelvin 64 Windows Accelerator 2MB PCI	199
Kelvin 64 Windows Accelerator 2MB VLB	199

OTHERS

MGP Card (monographic w. printer port)	29
Intel Smart Video Recorder	*(369)
Intel Smart Video Recorder Pro	439
Oak077 Super VGA 512k	52
Oak087 Super VGA 1MB	65
Paradise Window Accel 24 bit VGA	129
Video Plus (video image grabber)	185
V-Mate Pro (flicker free ext. video encorder)	189
WinVision (video capture)	165
Cardex :	
Cirrus Logic CI5428 1MB	99
Cirrus Logic CI5428 2MB VLB	145
Cirrus Logic GD5434 64 bit 2MB PCI	169
ET4000 Tseng Lab 1MB ISA	79
ET4000 1MB VLB	109
ET4000 W32p 2MB VLB	179
ET4000 W32p 2MB PCI	179
S3 Vision 864 64 bit 2MB PCI	179

(price) .... special, while supplies last

SOFTWARE

1. CD SOFTWARE

Call for Wholesale Prices

$5.99 Each

- Business Assistant
- Clip Media 2.0
- Club Kid Soft
- Jokes and Pranks
- Lazer Tax (480 tax forms)
- Mayo Clinic: Sampler
- MicroProse Game Sampler
- Selectware
- Shareware Collection
- Software Treasure Chest
- VGA Spectrum

$6.99 Each

- American Premier Shareware
- California Collection
- Game Arena
- Learning Adventure
- Sneak Peaks
- Ultimate Collection : Education & Games
- Windows Expert MPC

$7.99 Each

- Clipart Studio III
- CD Power Box 2.0
- CD Windows Box1.01
- Dr. Fun Pack
- Dr. Games
- Dr. Music
- Dr. Shareware
- Dr. Windows
- Image Compendium
- Kids Game
- Kids Rhyme
- Game Studio III
- Game Expert MPC
- My Talking Dictionary
- Super Games Dos
- Super Game I / II / III for Win

$8.99 Each

- 5 Star Game : Animation
- 5 Star Game : Education
- Adventure in Heaven
- Cybergenic Ranger (adventure game)
- Harry's Story Disc & Coloring Book
- Mario Is Missing + World Atlas 3.2
- Monster Media 93'
- Sound Library
- Shareware Heaven
- Too Much Shareware
- Town of Toons
- US Atlas 4.0 MPC

$9.95 Each

- 101 Best Selling Games DOS
- Audio Tester
- Better Windows & Works
- Business Phonebook 93'-94' DOS
- Capital Hill
- Doom + Accessories
- Font Expert MPC
- Font Elegeance
- Font Platinum
- Game Platinum
- Home & Business Platinum
- Learning Heaven
- MPC Multimedia Showcase
- Multimedia Platinum
- Publisher's Platinum
- Shareware Heaven II
- Shareware To the Maxx
- Sing-a-long Children (Dr. T's) MPC
- Top 201 Games
- US Helicopter
- US Submarine
- Utilities Platinum
- Windows Platinum
- Wizard (test & tune-up) MPC

BRODERBUND

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Arthur's Teacher Trouble MPC / MAC	17/37
Harry's Haunted House	36
Just Grandma and Me WIN / MAC	17/37
Math Workshop	38
MYST MPC / MAC	45/49
Printshop Deluxe CD Pack	75
Ruff's Bone MPC	36
Sampler	3.99
The Little Monsters At School MPC	36
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- Computer Reference Library
- Death Star Arcade Battles
- Dictionary and Languages
- Encyclopedia of Sound
- Flash Card Video (Math for grade 2-5)
- Game Jumboree
- Gardening
- Godzilla vs. Megaton
- Ham Radio
- Hilarious Sports Bloopers
- HIV Resource AIDs Guide
- Hugo House of Horrors
- Midi Master Collection
- Multimedia Manian
- Night of the Living Dead
- Our Solar System
- Personal Finance
- Porky Pig
- Sound Sensation
- Technotools
- The Complete Book Shop
- Windoware
- World Traveler

-- Shareware Overload Trio Pack 19

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- Bird
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- Deserts
- Food
- Field
- Hawaii
- Insect
- Lakes & Rivers
- Mountains
- People
- Resident Interior
- Sampler
- Sun Rise & Set
- Wildlife

DISCIS Series DOS, WIN, MAC

A Tree through the Seasons	13
Aesop's Fables	11
Aesop's Fables + Cinderella	15
Birds and How They Grow	13
Butterflies	12
Cinderella + Thomas Swimsuit (oem)	15
Dinosaurs	12
Farm Animals	12
Heather Hit Her First Home Run + +Moving Gives Me Stomach Ache	13
Long Hot Day at the Ranch	13
Paper Bag Princess + Mud Paddle (oem)	15
Somebody Catch My Homework	14
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Tale of Benjamin Bunny + Peter Rabit	13
The Scary Poems for Rotten Kids	13
Whales	12
What Air Can Do	13

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Animal Magic (6 games) DOS, WIN	28
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Banners WIN	16
Board & Strategy (26 games)	14
Brain Teasers (28 games)	14
Business Made Easy	16
Cards and Dice (24 games)	14
Clip Art & Fonts WIN	16
Doom & 24 Utility Programs	14
Early Learning Fun (age 4-7)	16
Family Learning	14
Fly and Drive (4 games)	16
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Graphics & Sound Explorer (33 utilities)	14
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Labels WIN	16
Leader Board Golf Game (16 courses)	16
Links Collector Golf	16
Links Solid Gold - 7 Courses	14
Pinball WIN	22
Private Eye	16
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Screen Effects	14
Top Tracks	16
Triple Tris	16
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Video Gambling WIN	19
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Plan-It Paradise for Win	26
Quantum Gate oem / reg	19/26
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Encarta 95' MPC	(oem 59)95
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- Computer Super Market
- Desktop Publisher's Dream
- Fashion Show 94'
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- Interactive Chinese & Games
- Internet Toolkit
- Library Images
- Math Made Fun
- Midi & Wave Workshop
- Music From Heaven
- Music Box 94'
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- Karaoke : Come and Sing Praises
- Jack & Bean Stalk
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Local Girls 3-in-1 / Tropical Girls 3-in-1	17/17
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Pretty Women WIN, MAC	18
Swimsuits WIN, MAC	18
Swimwear To The Maxx	18
The Women of Venus	20

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Beer - Home Brewing	25
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CD Rom of CD Rom	17
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Big Green	18
Blue Force	23
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Body Works Voyage	34
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Campaign	36
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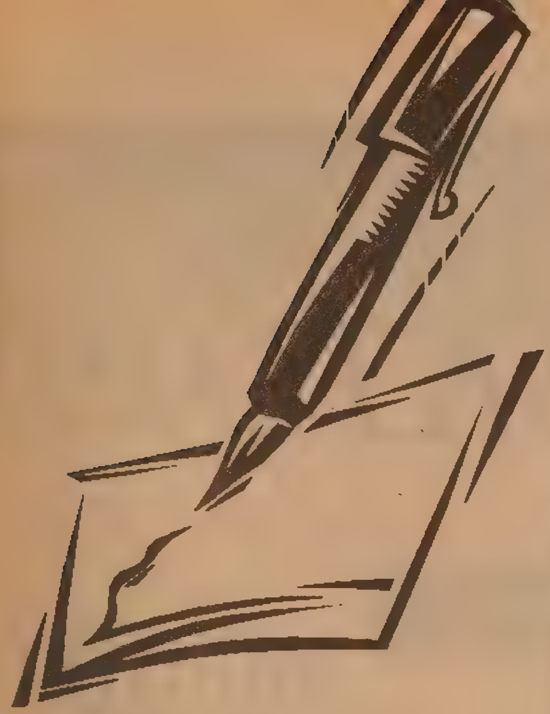

Letters

continued from page 14

code or some other measurable amount of production, would abuse the telecommuting privilege by simply keeping their machines on while they are not really working. But the solution is not to abandon telecommuting, but to rethink the concept of time-based compensation as a relic from the industrial revolution of the last two centuries, no longer appropriate for the global village of the twenty-first century.

Both tax and labor laws need to be rewritten to utilize the growing number of home workers who add value to a product, but simply do not fit into the typical hourly worker rules.

And as the Internet does not distinguish between a programmer who does his or her work in Mexico, India, or the United States, although the standards of compensation and tax laws may vary greatly, whatever those rules are going to be, they should be made with an eye toward universal applications.

Mark R. Thierman
Piedmont

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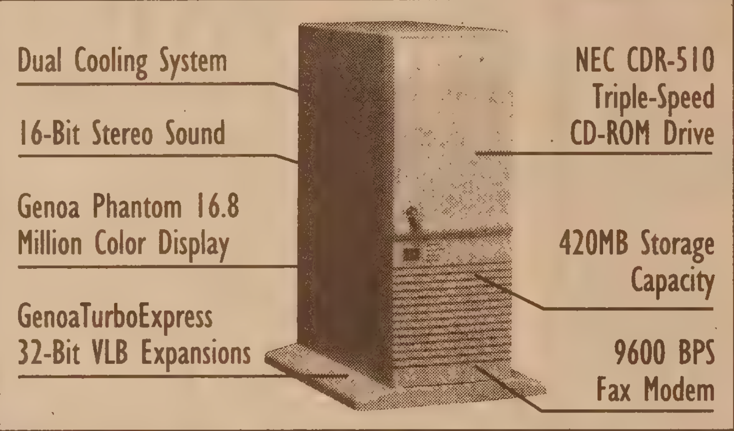
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Telecommuting *continued from page 63*

Software), other powerful programs for distance working include ProShare (from Intel), FarSite for Windows (from Databeam Corp.), and Face to Face (for two Macs, or one Mac and one Windows computer, from Crosswise Corp.). These utilities are helping to usher in an era when the distance between collaborators is of very little consequence in determining how effectively work can be accomplished.

Asia Pacific Telework Association

There's a new organization in the world of telework: The "Asia Pacific Telework Association." Founded only a few months ago, the APTA is concerned with developments and activities around the world, but concentrates in a "backyard" occupied primarily by Australia and New Zealand. The organization has already attracted nearly a thousand inquiries about its activities and objectives, which in addition to signing up telecenters, corporations, and teleworkers as members, include:

1) Representing the interests of members looking for work and for international contacts.

2) Maintaining contacts with like-minded organizations, around the world.

3) "Making representations" (which I take to mean advocating) with regard to telework-related developments, and also on behalf of members' interests.

For example, under a quirk of Australian law, a copyrighted work transmitted by paper or by computer disk is fully protected from piracy or theft, but the same work loses all copyright protection when transmitted electronically! The APTA says it knows of instances when material has knowingly been stolen and used without payment by the simple expedient of passing it through an electronic network. The problem extends not only to writers, but to lawyers, accountants, engineers, architects, computer programmers, and others who utilize electronic networks. APTA is lobbying to have the appropriate changes made to the present Australian law.

In the US, fortunately, copyright protection laws have been written more broadly, and courts have usually interpreted the laws to provide copyright protection in all media. Generally everything created in the US is automatically afforded copyright protection unless we give away such protection in writing. So you're free to deliver material to a client or employer by any means, without giving up the right to be paid for it.

Back in Australia, the APTA says the Australian Department of Primary Industries and Energy has committed to doubling the number of rural "telecentres" to forty-five or fifty over the next two years. These telecentres are used to earn income, to provide community services, and to gain work-relevant skills. In addition to these government-funded sites, there are many privately funded sites offering electronic messaging, telework stations, and more. Reportedly, the "small office and home office" sector of the Australian economy has been the fastest growing one in recent years. ■

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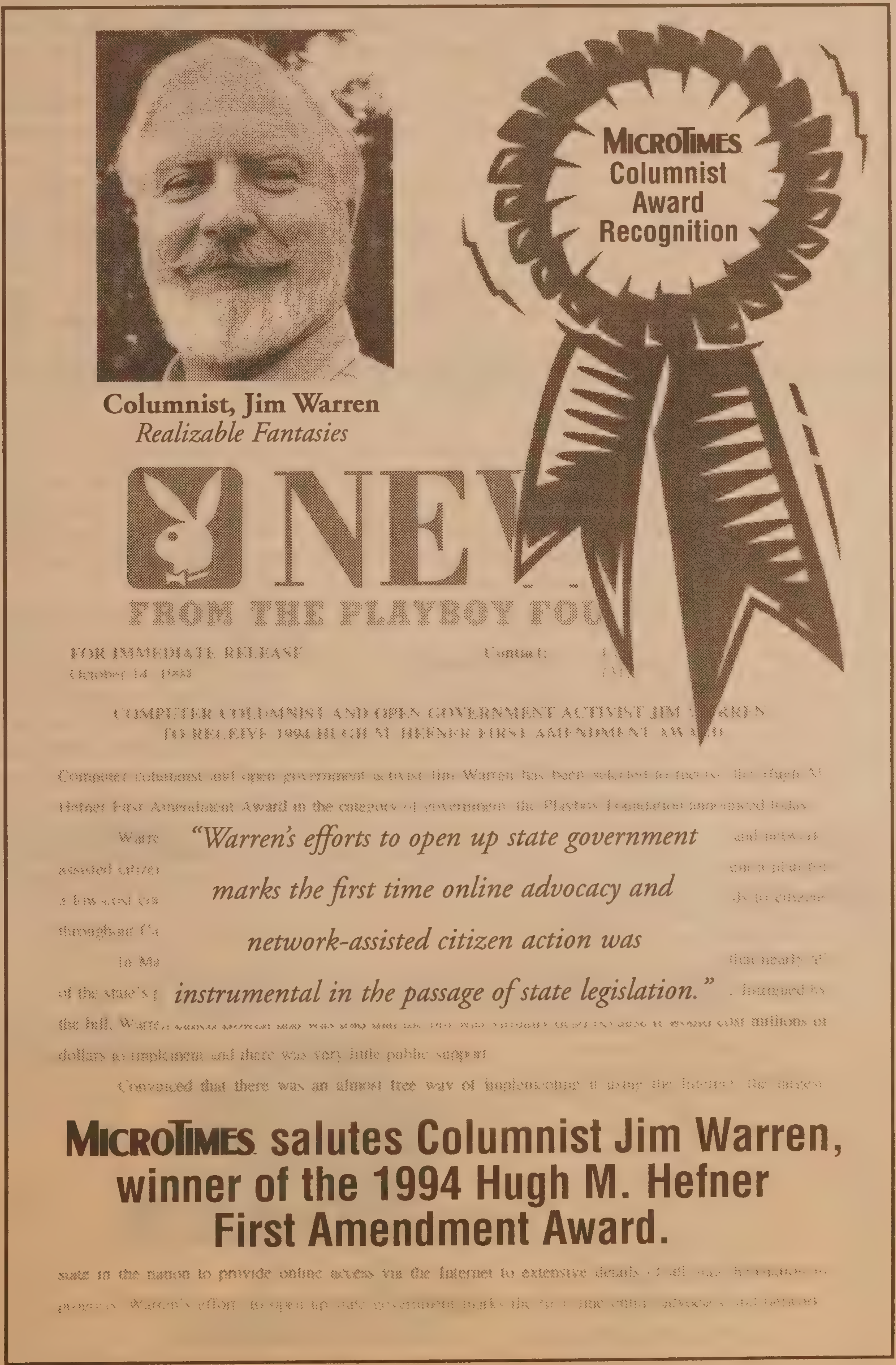
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Columnist, Jim Warren
Realizable Fantasies

"Warren's efforts to open up state government marks the first time online advocacy and network-assisted citizen action was instrumental in the passage of state legislation."

MICROTIMES salutes Columnist Jim Warren, winner of the 1994 Hugh M. Hefner First Amendment Award.

Accounting *continued from page 82*

Some labels are designed to track angels on the head of a pin, whereas large, easy-to-locate labels are desirable in other instances. If regular labels don't stick on your medium, you may need to use a fancy thermal transfer printer.

Getting The Right Recipe

Whether or not you use bar coding, selecting appropriate inventory software is a task unto itself. Shrink-wrapped inventory applications range from $49 cheapies to sophisticated works costing thousands. In making the selection, you'll need to consider not only managerial information requirements, but tax considerations as well. A review of your accounting practices should therefore be considered along with the bar code system enhancements.

In this regard, an important threshold, if you're a reseller, is if you gross at least $10 million dollars annually. At that income level, the complicated "uniform capitalization rules" may come into play, often requiring high-end software capable of supporting an elaborate system of cost allocations for tax purposes.

An overview of the latest inventory management software, from the household variety to high-end, as well as a guide to over a hundred vendors, is available in "Inventory Software, Keeping Track of the Pieces" in the February 1994 issue of *Accounting Technology.*

Reaping The Benefits

Because of the ready availability of additional inventory information, you may see opportunities to change your inventory accounting method to one that is more advantageous for tax purposes. Detailed analysis may reveal that adopting a particular method, which previously would have been too burdensome to employ, would now be practical.

With your added capabilities, for example, you might want to use the "specific identification" method, whereby each individual item is tracked for tax purposes, and deducted when sold. But without certain simplifying assumptions, inventory accounting, even on your newfangled system, can quickly become a computational nightmare. The IRS therefore permits a vast variety of simplifying assumptions, with names like "chain-link dollar-value LIFO," for reporting cost of goods sold.

If you do make such changes, beware of IRS requirements. Before changing your method of accounting, you must generally obtain the consent of the IRS Commissioner. If you fail to do so, the IRS can retroactively disallow your change. Even if a tax year is closed beyond the statute of limitations, the IRS can open that old can of worms and, applying the less advantageous method back to the earliest open year, make a cumulative adjustment—read "headache."

Automated tracking can vastly improve the quality of your inventory management within a reasonable budget. Numerous management decisions depend upon the accuracy of sales and inventory information, and various economic models out there quantify optimal reorder points.

Unfortunately, smaller, inexperienced businesses often fall short of this objective because of inadequate equipment or planning. A junky system gets utilized less frequently than it could. Take a good look around at what's available and get professional management or accounting advice if you need it. With the right shopping and prep work, bar-code systems today provide a simple technology that can be taken advantage of by any business with inventory.■

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RESOURCES:

David A. Simon, CPA
Oakland, CA
(510)893-5753

Bar Code Kit
Wynston Technologies, Inc.
1409 Corporate Dr.
McHenry, Il 60050
1-800-743-6647

Bars and Stripes
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5674 Stoneridge Dr., Ste. 119
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(510)416-8510

Scan-One
Vertical Technologies
3575 Market St., Ste. 240
West Valley, UT
1-800-477-5589

MAS 90 Evolution/2
State of the Art, Inc.
56 Technology
Irvine, CA 92718
1-800-854-3415

AccPac Plus, ScanPAC
Computer Associates International, Inc.
1240 McKay Dr.
San Jose, CA 98131
1-800-225-5224

Macola, Inc.
333 E. Center St.
Marion, OH 43302
1-800-468-0834

Synchronics Inventory Plus
RealWorld Corp.
282 Loudon Rd.
Concord, NH 03301
1-800-678-6336

Inventory Software article
Accounting Technology
(Feb 1994)
Faulkner & Grey Publications
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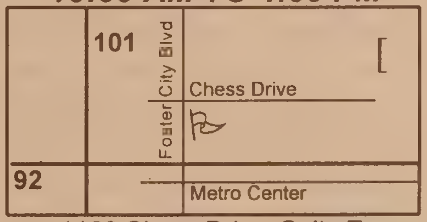

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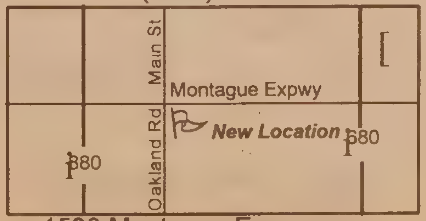

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VCs And The Internet

In recent months, venture capitalists have shown an increasing tendency to do business on the Net themselves, and also to invest in Internet-related companies. We asked a few of them how they used the Net, and also how they viewed it as an emerging business platform.

—*ME*

Wade Woodson

ww@spvc.com
General Partner
Sigma Partners

Sigma is quite interested in the growth and commercialization of the Internet, as indicated by our early investment in PSI, the largest commercial Internet access provider. Our other portfolio companies include STAC Electronics, Cascade Communications, Atria Software, Applied Digital Access, Wellfleet Communications, SuperMac Technology, Phoenix Technologies, Clarify, RayDream, Vivo Software, Endgate Technology, Worldtalk Corporation, and Octel Communications

As an open system, we feel that the Internet's scope will continue to expand, providing the sort of marketplace discontinuity in which fast-moving, innovative new companies can flourish. At the same time, the Internet is an immature medium for commercial purposes, and only those companies who understand its personality can really put it to work.

I use the Internet extensively. For venture capital purposes my use is primarily email communication with my portfolio companies and my business network. After hours, I use it as a resource for programming projects as well as a way to track news and gossip via Usenet.

Sigma is an information technology venture firm. Our largest concentrations of investments have been in communications and software. Despite the fact that our emphasis is on risky, early stage investing, more than half of all Sigma investments have achieved an IPO within four years of our investment and fewer than one in ten has lost money for us.

We believe that our fundamental advantage is the time and skill of our general partners and therefore run our business to ensure that all portfolio companies receive ample partner-level attention. At our firm, business plans are reviewed by general partners—not associates. Nevertheless, we are not in business to run companies. Our goal is to find talented entrepreneurs and managers with whom we can establish a close working partnership.

We invest on the West Coast and New England as well as selected pockets like Boulder, the Beltway, and the Twin Cities. Our preferred investment range is $1 to 1.5 million.

I have just begun to receive initial proposals via email and welcome inquiries to ww@spvc.com .

Don Gooding

dgooding@accel.com
Research Partner
Accel Partners

The Internet is integral to our investment strategy and approach.

First, we are investors in Internet-related companies. UUnet Technologies is an investment, and a number of our other networking and software investments offer Internet-centric products—Santa Cruz Operation and Remedy are two examples.

We believe the Internet is the most important information technology platform to emerge since the personal computer, and there will be hundreds of successful businesses—and attractive investment opportunities—built around the Internet over the next decade.

Second, we use the Internet for communications with our portfolio companies. One of the subtle benefits comes when we can be copied on the internal email lists of our companies, so that we are integrated with their own business processes. It allows us to be uniquely responsive and aware, with essentially zero cost for our entrepreneurs.

Third, we use the Internet for due diligence. While not all customer checks can be performed over the Internet, we can at times reach busy people and receive extraordinarily detailed replies to our questions, in a format that is instantly ready for our final investment memorandum! In addition, newsgroups are a great way to judge the relative importance of certain topics and vendors, and are a forum to elicit (relatively) unbiased opinions about vendors, technologies, architectures, and so forth.

Fourth, we use the Internet for prospecting. We have been able to uncover well over one hundred opportunities in the year that we have been on the Net. And since we have a high-speed link, we are able to do more prospecting than most.

We are absolutely interested in receiving solicitations over the Net. Inquiries come to us through the mail, the fax, hand delivered…and over the Net. We would strongly recommend sending only an executive summary, as email is not a great medium for sending large documents. Entrepreneurs will likely find more rapid responses, and more thoughtful responses, to email inquiries. I'm more likely to process my email in-box than my perennially full pile of business plans.

Finally, areas of interest for us continue to center around healthcare, communications, and software.

In networking, we continue to look at ATM-related opportunities (we have seven investments so far), ISDN-related products, networking for the small office/home office market, and products building upon emerging standards in computer/telephony integration.

In multimedia we continue to look at a wide variety of tools, titles, and services for business, consumer, and education markets.

In client server software we are receptive to broad applications (such as financial management), innovative tools, standards-based network and systems management, and email-enabled application opportunities.

Finally, in mobile computing we are bullish on PCS, wide area mobile data, and remote LAN access.

Michael Moritz

moritz@sequoiacap.com
Sequoia Capital

Sequoia's focus is what it has always been: financing promising ideas and companies in the electronics and medical arenas. We are willing to write checks as small as $50,000 and as large as $6,000,000.

Current Portfolio Companies:

Electronics: C Cube Microsystems, Global Village Communication, Flextronics International, Arbor Software, Avid Technology, Alantec, Security Dynamics...

Healthcare: Amylin Pharmaceuticals, SangStat Medical, Chemtrak, CV Therapeutics, Endovascular Technologies, Vidamed...

Areas Of Interest:

Electronics: data communications, wireless communications, software, semiconductors

Healthcare: medical devices and diagnostics, healthcare services and information, biotechnology

We use the Net a lot for inter-company email. It's helping us do business more efficiently. We have received business ideas and plans via the Internet, and we are always interested in hearing about more. ■

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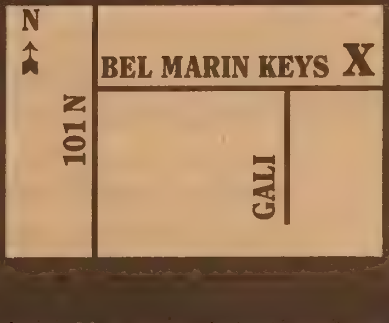

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continued from page 140

System 7.5 takes a significantly longer time than previous systems to boot up, and turning the Mac on and off again can take minutes.

stars) Sagan had forced Apple to change the code name of the Power Macintosh 7100. Apple then changed the code name to BHA, that was reported in the press to be an acronym for "Butt-Head Astronomer." Sagan then sued Apple for libel.

Recently, the Net was buzzing over the word that the Court had dismissed Sagan's suit. Part of the decision read:

"Plantiff's libel action is based on the allegation that Defendant changed the 'code name' on its personal computer from 'Carl Sagan' to 'Butt-Head Astronomer' after plaintiff had requested that Defendant cease use of Plaintiff's name. ... There can be no question that the use of the figurative term 'Butt-Head' negates the impression that Defendant was seriously implying an assertion of fact. It strains reason to conclude that Defendant was attempting to criticize Plaintiff's reputation or competency as an astronomer. One does not seriously attack the expertise of a scientist using the undefined phrase 'butt-head.' Thus, the figurative language militates against implying an assertion of fact. ... Furthermore, the tenor of any communication of the information, especially the phrase 'Butt-Head Astronomer,' would negate the impression that Defendant was implying an assertion of fact."

Am I missing something? A relatively short while ago, it was the mark of a great theatrical or Hollywood publicity agent to get your clients' names in the press, or attached to products. Having a client selected as Mr. Code Name down in Cupertino would have been a publicist's dream come true!

But Mr. Billions of Stars' britches are too big to be tied to a personal computer like a Macintosh. Maybe he would rather be Mr. VAX, or Cray.

So to avoid future trouble, computer code names will have to follow the guidelines for postal stamps and turn down any requests for living personages. Perhaps delegations from Chambers of Commerce of some depressed parts of the country could make presentations to Apple development teams and we could see such code names as Flint, Ozark, and even—Chicago! ■

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WHAT IS BMUG?

BMUG is an educational, nonprofit, consumer advocacy group organized to share information and provide critical direction to users and developers in the computer community worldwide. It is an independent advocate, not affiliated with any manufacturer, delivering trustworthy information and useful products.

Like any growing organization, it is many different things to its fifteen thousand international members. BMUG supports many special interest groups (SIGs), 18-line Planet BMUG and 11-line BMUG Boston BBSes, a software library, weekly meetings, publications, and much more. BMUG also puts out a semi-annual 500+ page book that we call our "newsletter."

Our motto continues to be: We're in the business of giving away information.

Come and join in the dialogue at the BMUG main meeting every Thursday evening, 6:30 to 9:30 (or whenever we finish), on the UC campus. BMUG West and BMUG South are monthly meetings held in San Francisco and San Jose. Check the Announcement Line at (510)549-2684 ext. 8.

The BMUG Office, 2055 Center Street (a half block from the BART station) is open to the public 8:30 am to 4:30 pm. Please come by, say hello, and meet other members.

The BMUG HelpLine provides volunteer technical assistance and telephonic hand-holding for our members. If your question can't be answered on the spot, we try to get you in touch with someone who can help. Improve your Macintosh education and help others by becoming a HelpLine volunteer!

BMUG has one of the most up-to-date, comprehensive software libraries around, with hundreds of disks filled with the latest versions of public domain or shareware programs. BMUG also produces CD-ROM collections, including the digital video TV-ROM™ Too, and the BMUG PD-ROM.

Planet BMUG and BMUG Boston are graphical user interface FirstClass bulletin board systems, offering the latest in shareware, as well as news, private email, rumors, etc. With our 18-line capability, you can have access to BMUG almost twenty-four hours a day. It's easy to use, fun, and a great resource.

BMUG can be found on most online services, including e•World. BMUG can also be reached through the Internet network through UG0001@applelink.apple.com .

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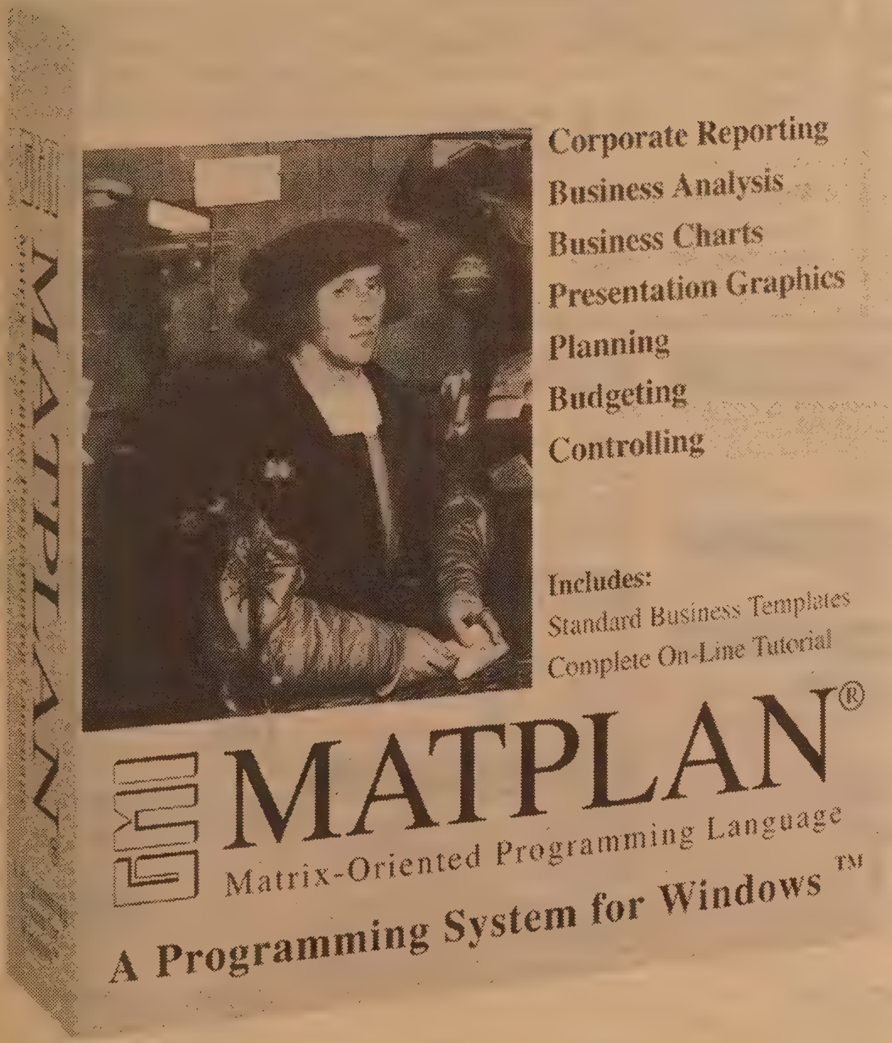
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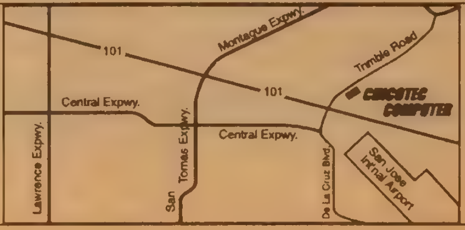

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Automated Fabrication

continued from page 152

At the end of the book, Burns even outlines the advantages of Autofab in space. The moon, for example, is lined with metallic dust. This, the author points out, could act as the "toner" for a fabricator's toner cartridge. Space colonization will be much easier if a large portion of "start-up" structures can be computer-generated on-site rather than transported by rocket.

What's Still Needed

When the cost of the necessary computer technology becomes cheaper, engineers and architects may be able to build useful things from their desktops. Scaled models could be generated quickly. Finished designs could be transmitted via telecommunications networks to far away (satellite?) fabrication sites.

So what's the holdup? Burns points to several areas which need refinement before the sci-fi machines of tomorrow become a reality.

Besides the obvious need for smaller, faster, cheaper computer parts, there is a great need for visualization tools and new investments. Better software will give the advanced user power over the parameters of 3-D production. Advances in virtual reality could make fabrication technology more accessible to people, as graphic user interfaces made "home computers" accessible in the 1980s.

> **When the cost of the necessary computer technology becomes cheaper, engineers and architects may be able to build useful things from their desktops.**

There are vast opportunities for entrepreneurs: the author mentions operating software, materials, design distribution, and ancillary services, among others as possible areas for exploration.

This book is a "must-have" for people in manufacturing. Its detailed descriptions and discussions are essential reading if one is considering the purchase of fabrication equipment to increase productivity in the workplace. Most interesting to this reviewer, however, were the chapters on Autofab's bright future. Entrepreneurs and technology professionals take notice—Autofab is on its way! ■

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RESOURCES:

Automated Fabrication
Improving Productivity in Manufacturing, $64.00
By Marshall Burns, Ph.D.
PTR Prentice-Hall, 1993
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Out of Control

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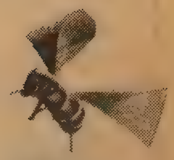


Yes, they do. They share a lot, and so the question is, "If they share a lot, are they it?" If it walks like a duck, talks like a duck, is it a duck?

Maybe yes, maybe no. It depends how you want to use it. Yes, "a corporation as an organism" is very old—hundreds of years old, maybe more. It's a very old idea that machines can be an organism too. The difference now is that rather than being just a poetic metaphor, we know enough about the principles of both machines and organisms to find out that there is enough of an overlap in their dynamics to be useful—and to use some of those organic principles in machines to make them work better, to make them act faster, think more intelligently, adapt quicker. So there is finally a payoff to that metaphor.

You talked a lot about a lot of positive things: better control, better dealing with limitations. Are we also beginning to face the "golem problem"—that the creature you've created gets out of control, and becomes a monster to you?

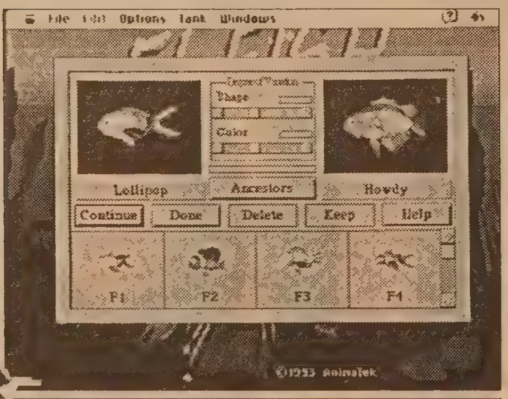
I don't think of it as the "golem problem" as much as maybe the "Goldilocks problem."

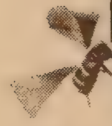
Anybody with kids knows that kids can be monsters. The problem you have with a kid is that you have a being that wants to have its own mind, its own agenda; and as parents that's what you want for it too.

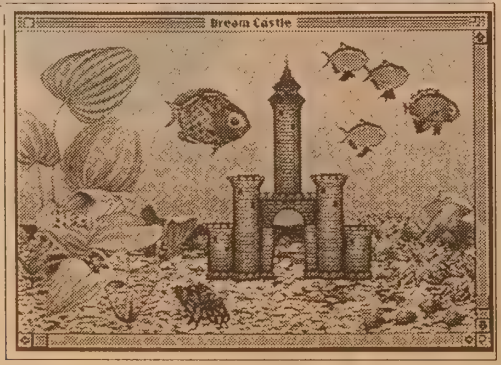
So how do you keep it from becoming a monster? The answer is not that you don't allow it to be born. The answer is not that you totally control it. The answer is that you train it up, you manage it, you instill certain operating principles, you guide it—and then you let go.

I think that it's the same thing with technology. It's true that many parents let go of kids that are monsters. What should we do about that?

It's not that you stop letting them go. It's that you have to train the mind in the right direction—not so that it's no longer unpredictable, or doesn't surprise you. In fact, quite the contrary, you would *love* it to surprise you; you would love a child to come up with something new or original.







The same thing with our technology. It has great power. Its greatest power can only be harnessed by us, in a selfish way, by letting go of it, and letting it have its own agenda and its own room to move. But that doesn't mean that we have to tolerate everything that it produces.

And in fact what we have to learn how to do, and what we are learning how to do, is to domesticate it, to train it, to manage it. It's a type of co-control, where you are sort of riding it, surfing it, harnessing it—all those words. It can still surprise us, but in the general directions that we want it to.

Which is not to say that we will never be unhappy with it, that it won't make mistakes, that it won't cause problems. But again, that is sort of what any parent knows.

"How do you keep a child from becoming a monster? The answer is not that you don't allow it to be born. The answer is not that you totally control it. The answer is that you train it up, you manage it, you instill certain operating principles, you guide it—

and then you let go.

Can you give an example of an "emergent life-form" that we have achieved that kind of co-control with?

Jurassic Park dinosaurs—those dinosaurs were re-created until they actually had, in the computer, a kind of virtual being. They had artificial bones, they had artificial muscles, they had artificial gravity, they had artificial skin. And the dinosaurs' movements actually emerged out of that combination—of trying to move this foot, this dinosaur that had all this virtual being and mass—and that's what gave it its realism.

The next step with these dinosaurs was to put in behaviors, little behavior models, so that rather than the animator having, say, to move each foot in the walk, the animator would tell the dinosaur, "Walk from A to B"; and the dinosaur's artificial mind, so to speak, would figure out how to move its legs. There's an example.

The human operators, the human animators, were not deciding where to move the leg. The dinosaur had a certain amount of freedom in that. And that freedom actually made the walking more realistic, besides easier. There is a certain direction you want to get, from here to there, and how you get to there doesn't really matter.

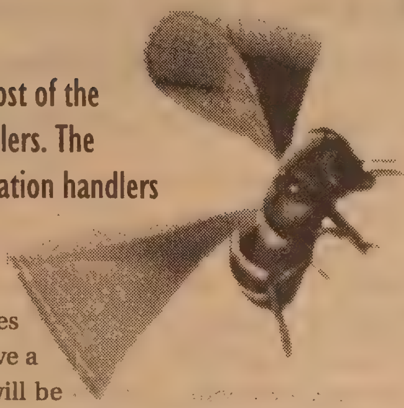
You said the virtual dinosaur from Jurassic Park was also usable in The Flintstones?

The Flintstones, and now there are a lot of experimental characters, not commercially presented right now. They are looking at other kinds of synthetic actors, where you give them stage directions. You say, "Walk from here to here, and throw down your glass angrily." All the multiple possibilities of actions in between that are decided by this character, which is kind of located on a computer. That's one direction in which this kind of thing can be directed.

The other very parallel path to that is that cartoon characters, I discovered, are kind of like robots without bodies. So the same kind of thing is happening with robots. You tell a robot, "Paint this chair." You don't necessarily have to tell it in what steps to paint the chair. It's painting it all white, and there's no problem; but it's still a very complicated task.

One could get to the point where we say, "Paint this chair," and we have the line "Decorate the chair," and the robot arm is painting it and adding color and stuff. Within certain limits we are going to accept the product or not; and we'll train them with heuristics, saying, "Use complementary colors, orange and blue." We'll teach them the laws of art, essentially, within certain parameters.

And this is not something that is horrible. This is not harm. The fact that we're turning over a certain control is something we do all the time with other biological organisms. The thought of doing it for machines is, I think, unnecessarily scary. It's a past pattern that we can overcome.



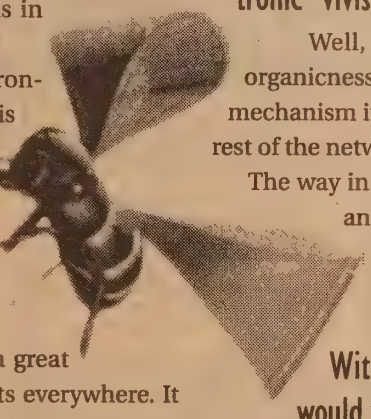
We have a pretty deep fear of machines. Most of the people who read this are information handlers. The machines you are talking about are information handlers that will probably outperform them. Why shouldn't they be terrified?

Well, I guess the terror of machines comes in several varieties. There are those who have a legitimate concern that their livelihood will be replaced. Most of the people, I think, who are afraid of being replaced by machines should *embrace* machines to replace those jobs. I mean, who wants to have a tedious job assembling little parts into plastic dolls, or painting the same fender a thousand times a day? It's a very toxic job. So a lot of the jobs that will be lost *should* be lost to machines.

The other fear of machines is, I think, a more recent one: machines as symbolizing the destruction of the environment. What I like to stress in my book is that those are two separate things, that the rise of machines does not necessarily mean the environment has to be destroyed, completely.

And a third fear of machines is this matter of control. Because there are often mistakes made by machines, and they are sometimes large-scale mistakes, there is a fear that since we do not control the machines, or if we cannot control them, therefore we shouldn't trust them. Of the three fears, my book addresses mostly the third one, which is the control aspect.

The analogy that I make is that if we were living on a steel planet right now, a great big steel sphere, and there was no biological life on it, and some young group of twenty-year-olds comes in and says, "Hey, we have this great thing we want to bring in. We have this dump truck full of seeds. You know: life-matter and propagation and twigs and stuff. We're going to put this in here and it's going to be marvelous."



And they say, "Oh wait wait wait wait. We need an EPA environmental protection report that follows the consequences of this and tells us what's going to happen."

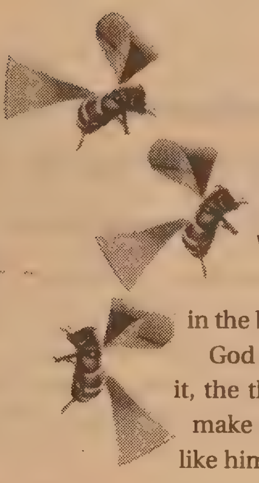
So after months of study they make this long report, and it says, "Well, this stuff comes in, and it starts to grow everywhere. It grows in every single crack. It takes over. It splits up the steel. Things spread everywhere. It replicates of itself. There're viruses that will affect you. We have no idea what happens. Species will come up on their own. It forms a great matrix for all kinds of natural phenomena like wildfires. It gets everywhere. It just takes off and it completely fills your whole earth and it has its own agenda. You'll get sick and die from it. There's rats and vermin."

It goes on and on and on, and there's no way in the world that anybody would accept this as desirable. Stuff is happening out there and we have no idea how it works.

Well, biology is a technology. That's the other message of my book. Biology is a very sophisticated type of technology. It's a technology that we didn't invent, but it's a technology. Those little plants out there are a type of machine. And we accept this, we accept the tradeoff. We accept the fact that we grow tomatoes and have no idea how they work, because the benefit we get certainly outweighs it. And we don't have much choice.

People seem to say: "I want biology, but I don't want machines." I think what happens with the kind of technology we're making, as it becomes more biological, is that the power it offers becomes more biological-life-like, and we still have the same kind of decision to make, which is: "It will work on its own, it will do this wonderful stuff, there's a tradeoff, there's a price," which is we don't completely understand it, we're not completely in control of all of it.

But overall it will be a positive. We will deal with the downside. We will deal with the outbreaks of stuff. And we will pay the price.



Did the same debate take place among the angels when humans were being made?

Probably. And you know the little parable that I tell in the book, of the Genesis story.

God the Creator, who is this sort of "software being," you call it, the thing that makes the universe, decides that he wants to make one of his creations to be a being that can also create, like him. So you have these things down here with two legs that go around creating paintings, a TV show, they're creating wars, and they're creating cathedrals and whatnot.

And they get to a point, very much in the cycle of things, when they decide that *their* ultimate creation could be to create a thing that could create, like them. It's like this whole cycle.

I think that if we look at the Genesis story, of God saying, so to speak, "If I give you the ability to create, then that means that you have the ability to be a monster or not. That is the only way I can give you that full creativity. If I limited it to you, which I don't want to do, it's boring. If you're going to make what I tell you, that's not creation. But to have true creativity, you have to be able to go anyway you want, to be a monster, to do evil. You will be punished if you do, but you have that option."

I think the same thing happens when we are making our own creations-that-can-create, which is that to have that full power to surprise us, to make up original and new things, to be really generally creative, we have to allow the possibility of a monster.

Where could a person look in their environment to see mechanical and electronic "vivisystems" in the present, rather than ten years from now?

Well, the Internet is close to having some of the qualities of this organicness. The packet-switching network could be viewed as a self-repair mechanism in some sense, because if one part of the network goes down, the rest of the network sort of repairs itself by routing around.

The way in which the Internet grows is very much of an organic model. It's an incremental adding-on. It's how a cell expands. 747s don't grow. Most of the things we make don't grow in an organic way, but the Internet does have an organic growth model.

With the awareness you have right now, in what kind of business would you be investing?

In the news these days is the sort of almost-demise of thinking machines, of parallel computers—and I think that's what I would invest in right now. I would invest in parallel processing machines; because even though right now they don't seem to be doing very well, that is definitely the direction things are going to move. Parallel equals organic, basically.

What industry would you predict is the buggy-whip of this cycle? What industry is really going to die?

That's a good question. For the long term, I would not invest in modems. I think that someone like AT&T should do all this stuff internally. I mean there shouldn't be banks of modems in people's lives. As I understand modems, they perform a really weird function, and they seem to be an unnecessary step in the greater transparent step that you like, where you have digital data and you send it along a wire, and it is switched to where you want it. I think modems are a very short-term technology, a step to somewhere else.

The problem is that usually it is very rare for a technology to completely replace something. Books are going to be around, magazines are going to be around, faxes are going be around, although one hopes that analog faxes go away.

> **"Biology is a very sophisticated type of technology. It's a technology that we didn't invent, but it's a technology. Those little plants out there are a type of machine."**

I don't think I would invest in a major TV network. Well, it's very obvious that with fiber-optics and satellites coming down the line, the dominance of the three major TV networks and their broadcast-based model is going to go away. In fact I don't think I'd even invest in the big online services—CompuServe, AOL—because I think they also are going to go away relatively soon.

You talk about the "I-point," the "Irreversibility Point" in living systems. Have we reached that with mechanical life?

Yes. The complexity of machines has reached the point where it has the richness necessary for life. An example of that is that there are two or three computer viruses written a day, which is an astounding number. It's mostly sort of underground work. And as far as anybody knows, no computer virus has gone extinct. So one could say, as long as there are computers there will be computer viruses.

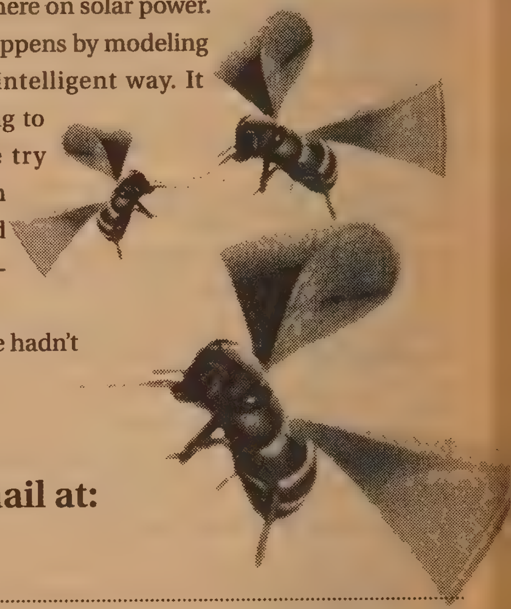
I think that we've reached that point, that as long as there are humans around, machines will be around. It will just not go back.

There's another level of the I-Point where you have self-replicating machines. You have robots that make robots, and humans are out of the loop. You have little tiny "gnatbots" that are breeding and making gnatbots—then that's a different level of the I-Point which we have not reached yet. But we could look forward to reaching it.

It might be a hundred more years before we have completely autonomous, self-replicating, self-metabolizing mechanical life—I mean, ones that we didn't have to give batteries, they're just out there on solar power.

And we will still try to direct what happens by modeling the very vast connections in some intelligent way. It seems to me that the best way is going to be an evolutionary way, where we try something, many things. A lot of them fail. We select the ones that work, and make the variants of those, and go forward.

And it may lead in directions that we hadn't conceived. ■



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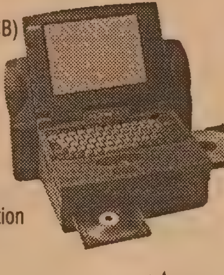

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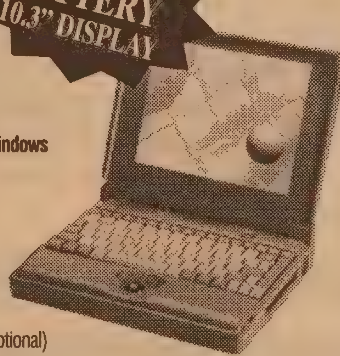

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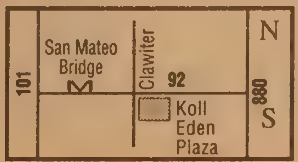

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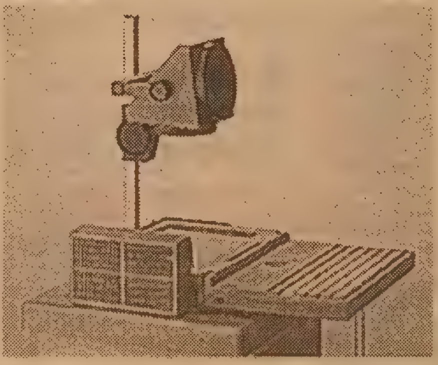

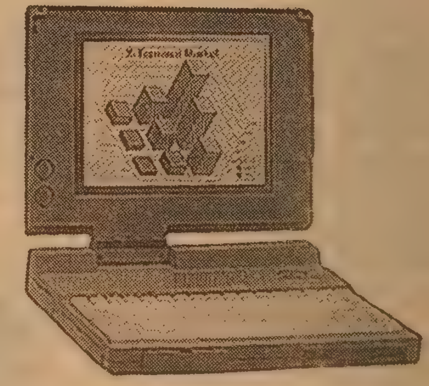

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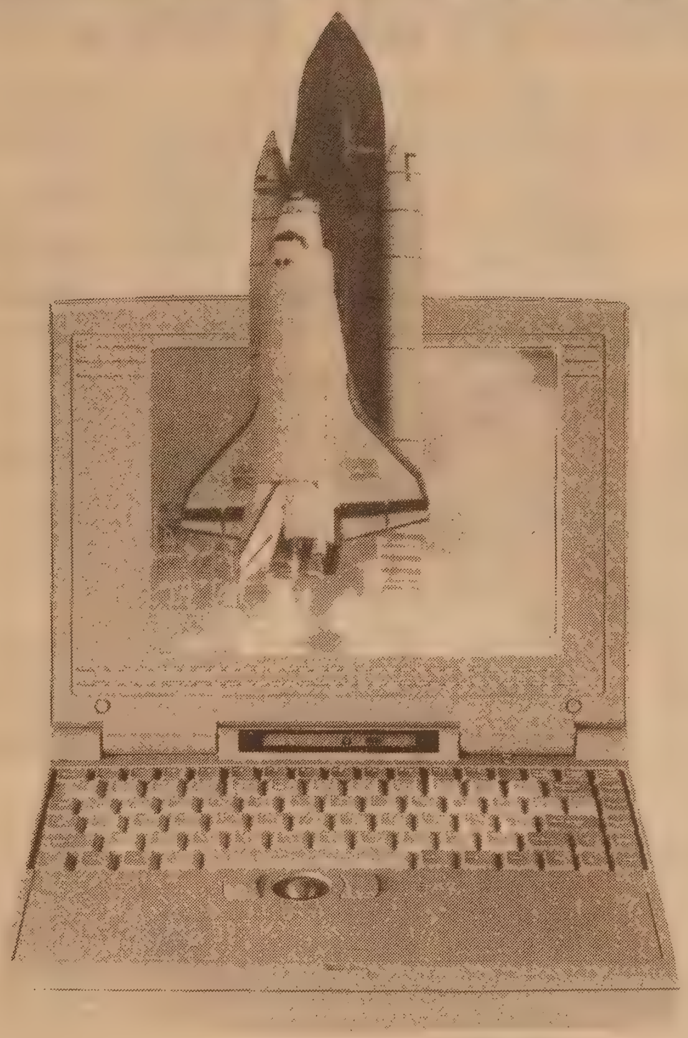

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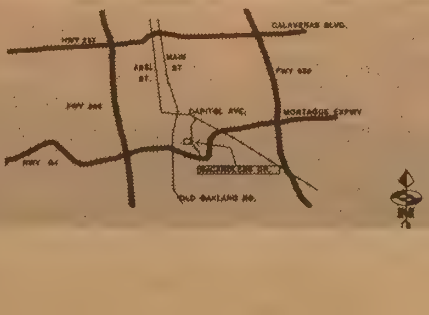

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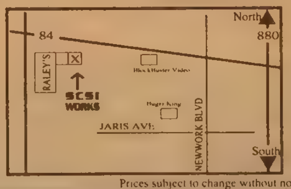

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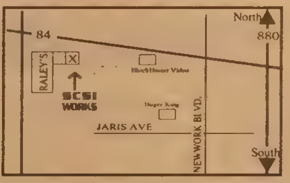

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Continued from page 212

about weather conditions; fitting the parts together; observing and grouping; and discovering nature, the seasons, and the environment. Available for Mac and PC, with a CD-ROM version scheduled for the fall. ($33.95) Edmark Corp., 6727 185th Ave. N.E., P.O. Box 3218, Redmond, WA 98073-3218. 1-800-426-0856, (206)556-8400.

Misc.

NEC MultiSync 9PG Plus

The MultiSync 9PG Plus is a high-performance, large-screen CRT projection system that offers 1500 x 1200 resolution and provides a wide range of horizontal scan frequencies. It includes three proprietary technologies to improve image quality: AccuBeam allows custom zone focusing of the projected image for improved accuracy; digital wave convergence for highly accurate convergence; and AccuPoint digital convergence memory, which allows users to switch back and forth between graphics and video sources while retaining at least 99.8% convergence accuracy. Multiple-frequency circuitry enables the projector to accommodate the high-resolution signals of computers and graphics boards as well as the usual video and RGB signals. The 9PG Plus is designed for unattended and attended presentations and can turn itself on and off, change sources, and select the days of the week it should operate. A lower-resolution, less flexible model, the 6PG Plus, is also available. ($20,500) NEC Technologies, Inc., 1255 Michael Dr., Wood Dale, IL 60191. 1-800-NEC-INFO.

Kodak DCS 420 Digital Camera

The Kodak DCS 420 Digital Camera is a high-resolution megapixel camera that combines superior image quality with ease of use and portability. It consists of a special electronic back fixed to the body of a Nikon N90 camera, and it employs a full-frame CCD imager measuring 1524 x 1012 pixels for a total resolution of 1.5 million pixels. It captures 12 bits per RGB color (36-bit color), offers equivalent ISO ranges of 50 to 400 in color and 100 to 800 in black and white, and can shoot a five-image burst in 2.25 seconds. The DCS 420 supports removable PCMCIA storage media and is powered by a rechargeable nickel hydride battery pack that delivers at least one thousand exposures per charge. It also includes a built-in microphone that can record "telephone-quality" audio clips and a SCSI cable to connect directly to a Mac or PC. The DCS 420 is available in three models: the 420c (color), 420m (black and white), and 420IR (infrared). ($10,995, includes Nikon camera) Eastman Kodak Co., 343 State St., Rochester, NY 14650-0405. 1-800-242-2424.

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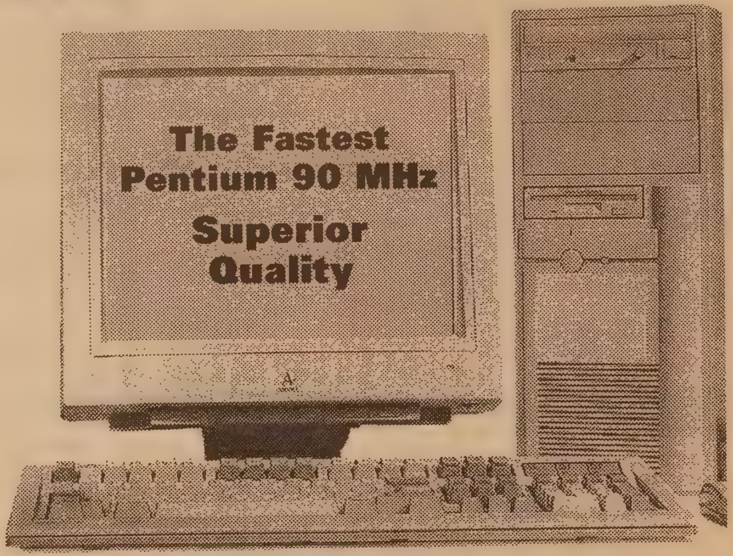

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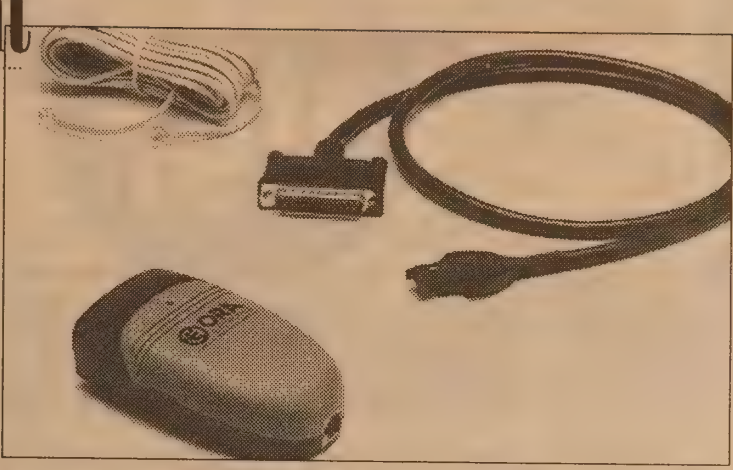

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Cardinal 14.4/19.2 Modem

The Cardinal 14.4/19.2 modem for Windows features the AT&T Controllerless Modem Chip Set which provides both V.32bis and V.32terbo capability. The Chip Set takes advantage of the host CPU to perform modem microcontroller software functions and eliminates the need for a separate modem controller chip and the associated memory constraints. By designing this modem exclusively for Windows, Cardinal has eliminated the bottlenecks that limit other modems, enabling it to reach throughput speed of over 143,000bps, compared to 57,600bps for other 14.4 modems. The Cardinal 14.4/19.2 modem provides everything needed to access the Information Superhighway. It comes packaged with SofNet's FaxWorks fax software and data communications software. Also included are free trial memberships for online services, such as CompuServe, Prodigy, America Online, and others. Cardinal's EZ-Install software checks the PC to determine the modems default setting, shows them on screen and automatically installs the included software packages. ($99) Cardinal Technologies, Inc., 1827 Freedom Rd., Lancaster, PA 17601. (717)293-3000. ■

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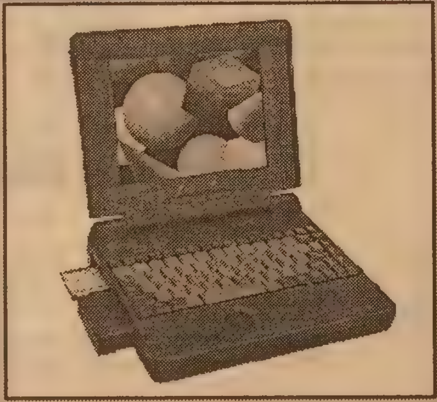

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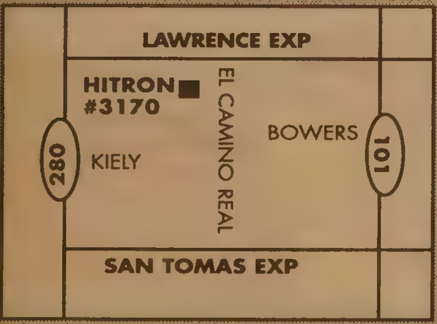

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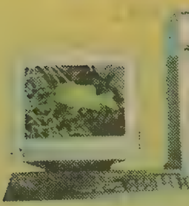

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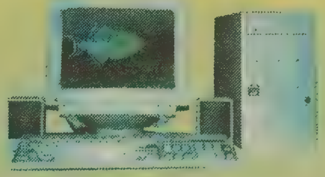

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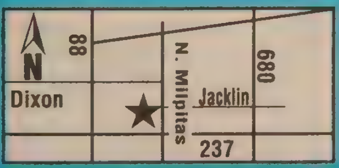

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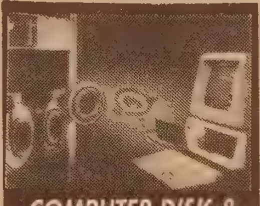

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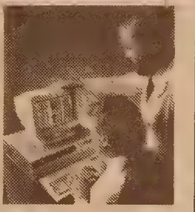

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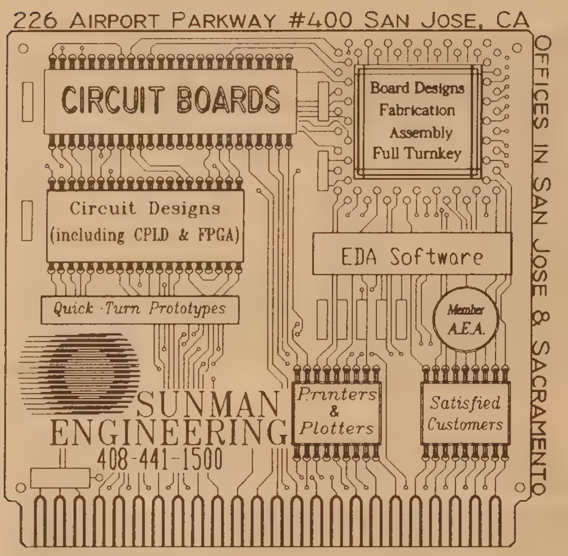

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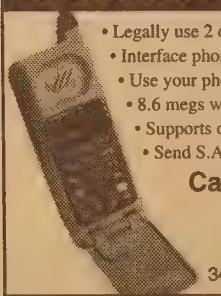

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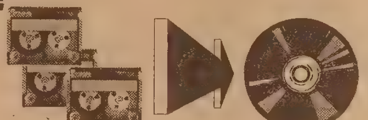

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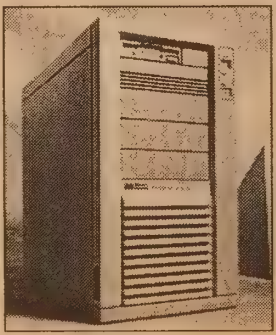

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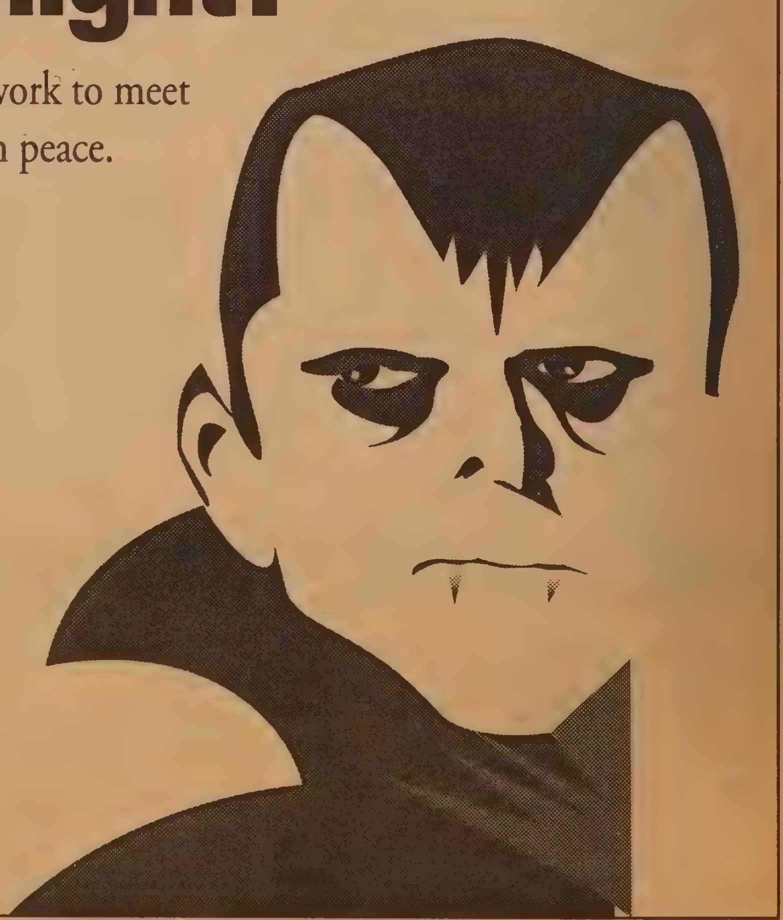

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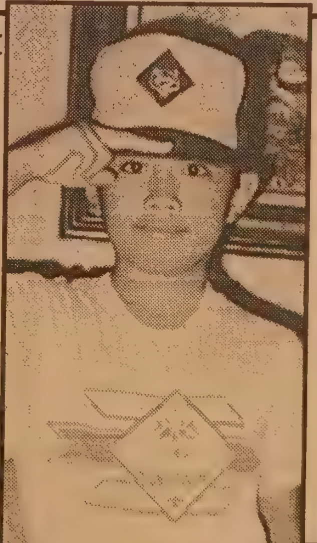

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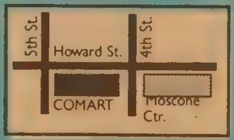

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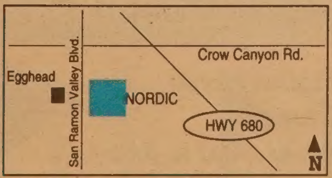

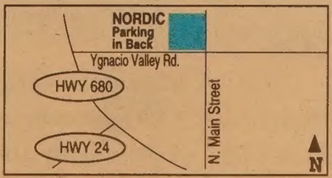

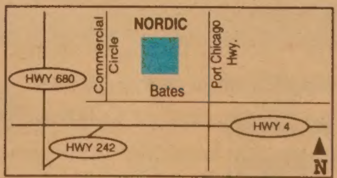

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DVORAK'S LAST COLUMN • BY JOHN C. DVORAK

Dvorak's Guide To Urban Folklore, Part 1

Or

How The Public At Large Has All The Best Comics

As many of you are aware, the Internet, as well as other public systems, has become a new conduit for Urban humor. This is a form of folklore whereby various jokes and cartoons are passed from person to person from office to office to be posted on walls and faxed to friends. In a typical folkloric fashion, the source of 99% of the material is lost; in fact, most of the humor is rewritten over and over as the recipients add their personal twists.

Years back, I was privileged to attend the Folklore classes at the University of California, where professor Alan Dundes regaled his students with Urban humor, and I have become an avid collector myself. While most of this stuff tends to be rewritten classical material, I was amused to find this rather new piece floating around the Net.

In fact five people shipped me a copy (two were from IBM).

The Top 11 Things People Think The 95 In Windows95 Really Stands For

11. The percentage that will be complete on the shipping date.
10. The number of floppies it will ship on.
9. The percentage of people who will have to upgrade their hardware.
8. The number of megabytes of hard disk space required.
7. The number of pages in the *EASY-INSTALL* version of the manual.
6. The percentage of existing Windows programs that won't run in the new OS.
5. The number of minutes to install.
4. The number of calls to tech support before you can get it to run.
3. The number of people who will actually *pay* for the upgrade.
2. The number of MHz required for the OS to run.

And now the #1 thing people think the 95 in Windows95 really stands for...

(Drum roll please...)

1. The year it was *DUE* to ship.

Personally I hate top-ten lists done in the Letterman style, but this one was pretty funny.

Cynicism seems to be a theme of Urban humor. A good example is this recent Question and Answer piece done about the Information Superhighway.

Q: What is the Information Superhighway?

A: It's just like the Internet, except:

- *it's a lot more expensive.*
- *you can't post and there's no killfile.*
- *there's no alt.sex.* or alt.drugs .*
- *rec.humor.funny has a laugh track.*
- *there's a commercial break every 10 minutes.*
- *everything is formatted to 40 columns for TV's.*
- *the free software costs you $2.00/megabyte to ftp, more for long distance.*

A: It's just like cable TV, except:

- *it's a lot more expensive.*
- *the picture isn't as good.*
- *there's 500 channels of Pay-per-View and home-shopping.*
- *you can watch any episode of Gilligan's Island or any Al Gore speech for only $2.00.*
- *no public access channels.*
- *there's a commercial break every 10 minutes.*

A: It's just like renting videos, except:

- *it's a lot more expensive.*
- *there's only 1/100th as many to choose from.*
- *no porno.*
- *there's no pause, fast-forward, or rewind, and it costs you another $3.95 if you want to watch twice.*
- *there's a commercial break every 10 minutes.*

A: It's just like the telephone, except:

- *it's a lot more expensive.*
- *there's no one to talk to.*
- *there's a commercial break every 10 minutes.*
- *every number is a toll call.*

I suspect that piece will be continually rewritten until it is very polished. From the looks of it that particular humor has not been worked on much by the public.

Next time: Elephant Hunters. ■

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Q: What is the Information Superhighway?
A: It's just like the Internet, except:
• it's a lot more expensive.
• you can't post and there's no killfile.
• there's no alt.sex.* or alt.drugs .
• rec.humor.funny has a laugh track.
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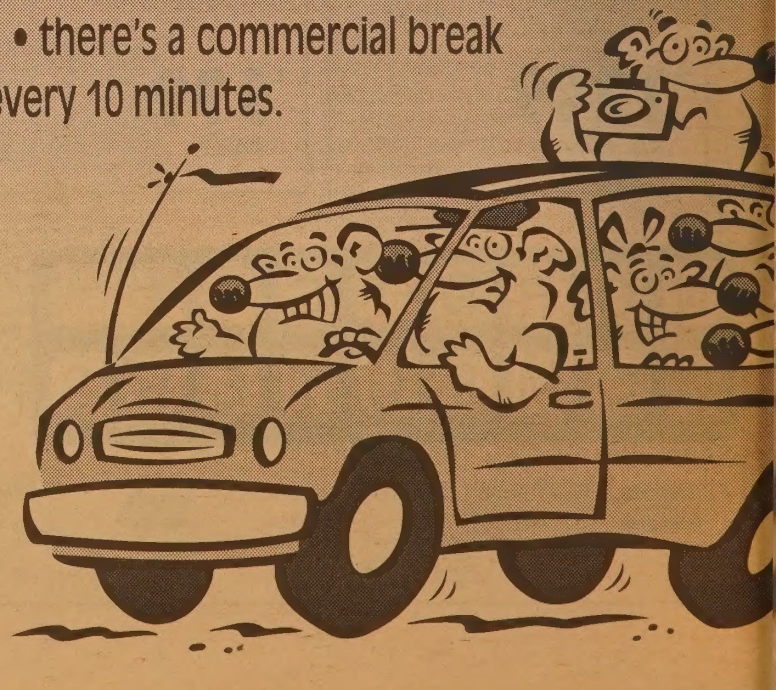

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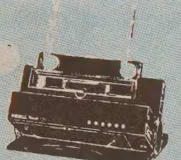

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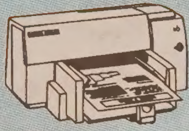

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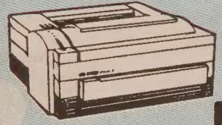

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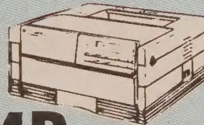

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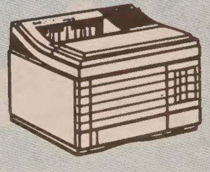

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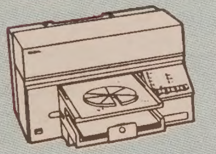

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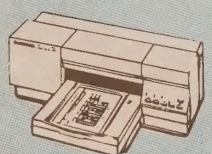

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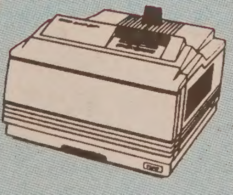

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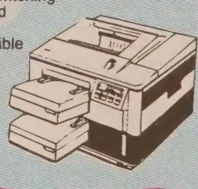

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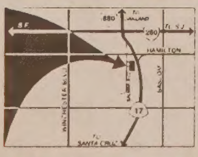

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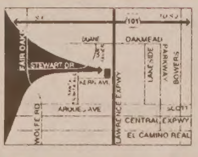

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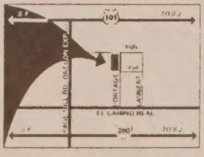

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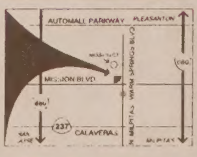

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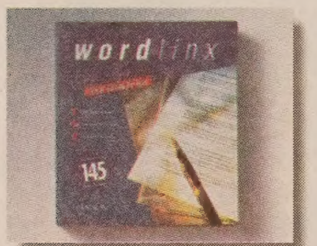

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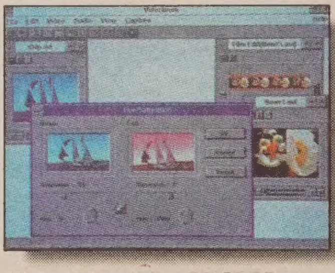

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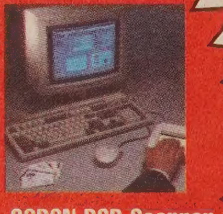

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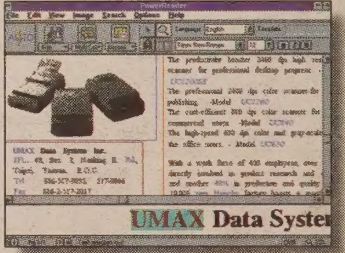

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